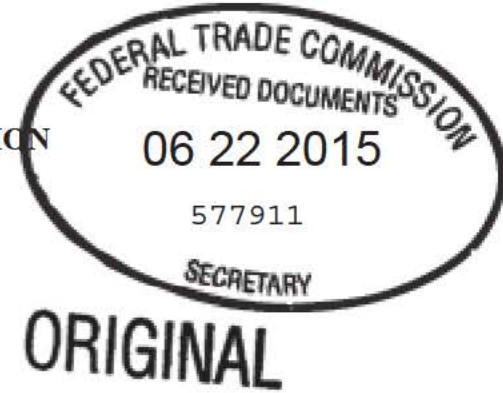


UNITED STATES OF AMERICA  
BEFORE THE FEDERAL TRADE COMMISSION



COMMISSIONERS: Edith Ramirez, Chairwoman  
Julie Brill  
Maureen K. Ohlhausen  
Joshua D. Wright  
Terrell McSweeney

\_\_\_\_\_)  
In the Matter of )  
)  
ECM BioFilms, Inc., ) Docket No. 9358  
a corporation, also d/b/a )  
Envioplastics International ) PUBLIC  
)  
\_\_\_\_\_)

**COMPLAINT COUNSEL'S SUPPLEMENTAL BRIEF  
RESPONDING TO ISSUES RAISED BY THE COMMISSION**

**I. Questions Presented by the Commission**

Below, and in Dr. Frederick's attached declaration, we address the Commission's questions about the survey evidence in this case. The answers unequivocally demonstrate that affixing biodegradable labels to items that are not traditionally regarded as biodegradable (like plastic) *causes* a substantial fraction of consumers to think they will break down within one or five years.

- A. Can the survey evidence in the record be interpreted as causal or experimental surveys with appropriate test and control groups? Would it be appropriate to do so? If so, please explain what inferences can be drawn from such an interpretation in light of relevant legal authority and statistical methods. If not, please explain why not.**

Experimental survey evidence in the record has appropriate test and control groups and demonstrates that at least a significant minority of consumers understand the biodegradable claim to mean complete decomposition within one year, and more within five years.

### **1. The Legal Standard For Extrinsic Evidence**

The Commission prefers experimental surveys as direct evidence of what consumers think of the specific advertisement in question. *In re Thompson Medical Co. Inc.*, 104 F.T.C. 648, 788-89 (1984); *Kraft, Inc. v. FTC*, 970 F.2d 311, 318 (7th Cir. 1992). But it also relies on other forms of extrinsic evidence, including consumer testimony, general marketing research, and expert opinion, all of which can help to explain how consumers “ordinarily” perceive or understand advertisements. *See Thompson*, 104 F.T.C. at 788-89; *see also Kraft*, 970 F.2d at 318 (citing *FTC Policy Statement on Deception*, 103 F.T.C. 174, 175 (1984)) (“*Deception Statement*”)); *In re Telebrands Corp.*, 140 F.T.C. 278, 291 (2005). Indeed, the Commission will consider any form of reliable evidence of consumer interpretation. *Deception Statement*, 103 F.T.C. at 176, n.8.<sup>1</sup>

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<sup>1</sup> In fact, extrinsic evidence is not required: the Commission may rely on its own reasoned analysis. *In re Crown Cent. Petroleum Corp.*, 84 F.T.C. 1493 (1974); *FTC v. Colgate-Palmolive Co.*, 380 U.S. 374 (1965); *Kraft*, 970 F.2d at 319. Considering extrinsic evidence is only necessary if “initial review of evidence from the advertisement itself does not allow [the Commission] to conclude with confidence that it is reasonable to read an advertisement as containing a particular implied message.” *Thompson Med.*, 104 F.T.C. at 788-89 (1984). When evidence is offered to assist the Commission in interpreting advertising representations, it supplements rather than supplants the Commission’s expertise. *Crown Cent.*, 84 F.T.C. at 1540. The Commission has long held the view that an unqualified biodegradable claim implies complete breakdown in a reasonably short period. 16 C.F.R. § 260.8. The record’s extrinsic evidence both confirms this view, *see infra*, and demonstrates that consumers understand a

The Commission weighs the probative value of extrinsic evidence the same as other evidence. *Crown Cent.*, 84 F.T.C. at 1540. It considers (inevitably imperfect) survey evidence reliable as long as the survey is “methodologically sound,” *i.e.*, it draws valid samples from the appropriate population, asks appropriate questions in ways that minimize bias, and analyzes results correctly. *See* CC App. Br. at 13 (*citing In re POM Wonderful*, No. 9344, 2013 FTC LEXIS 6, at \*45, quoting *Kraft*, 114 F.T.C. at 121); *Thompson Med.*, 104 F.T.C. at 788-89; *Stouffer Foods*, 118 F.T.C. 746, 808 n.27 (1994)). In addition, the Commission considers expert opinions reliable if adequately supported, *i.e.*, they “describe empirical research or analyses based on generally recognized marketing principles or other objective manifestations of professional expertise.” *Thompson*, 104 F.T.C. at 788 n.11.

The record in this case contains reliable experimental and observational consumer survey evidence. That evidence both independently and collectively demonstrates (along with the intent evidence<sup>2</sup>) that a significant minority of consumers understand a biodegradable claim to mean complete decomposition within one year or five years.

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biodegradable claim causes that period to be within at least five years (for a third of consumers) and within one year (for a significant minority).

<sup>2</sup> The Commission should also consider the overwhelming evidence that ECM intended to imply that its additive would make plastic completely break down into elements found in nature in a landfill in a reasonably short period of nine months to five years. CC App. Br. at 29-30; *POM*, No. 9344, 2013 FTC LEXIS 6, at \*51. *Accord Novartis Corp.*, 127 F.T.C. 580, 683 (1999) (“[E]vidence of intent to make a claim may support a finding that the claims were indeed made.”); *Telebrands*, 140 F.T.C. at 304 (finding support that claims were made in “ample evidence that respondents intended to convey the challenged claims”); *Thompson*, 104 F.T.C. at 791 (“Thompson intended to make these claims . . . [and] [t]herefore, it is reasonable to interpret the ads as making them[.]”). Even when ECM began using the “some period greater than a year” disclaimer, it continued to tell customers to expect complete landfill biodegradation in nine months to five years. CC App. Br. at 30. In fact, as Dr. Frederick explained, the disclaimer actually *reinforced* consumers’ expectations for short biodegradation times, by anchoring “a year” in consumers’ minds. *Id.* at 28.

## **2. Experimental Evidence Demonstrates that the Biodegradable Claim Causes Consumers to Infer a Short Timeframe.**

Although the Commission does not require experimental surveys, it has recognized the need for a controlled experiment in certain circumstances, such as closed-end surveys or when evidence suggests that a preexisting belief could bias the results. *See, e.g., Stouffer*, 118 F.T.C. at 746. Experimental studies manipulate an independent variable to determine its effect on a dependent variable (*e.g.*, did *x* language imply the claim?), in contrast to observational studies, which gauge consumer beliefs at a moment in time (*e.g.*, what does this language mean to you?). *See* Frederick Dec. ¶¶ 6(a)-(b), 9. Comparing test and control questions allows a researcher to rule out alternative explanations for the observed effect. *See id.* at ¶¶ 3-4, 6(b).

The observed effect in every study in the record is that many consumers understand an unqualified biodegradable claim to convey breakdown within a short period (about 20% within one year; about 35% within five). *Id.* at ¶ 3-4. By comparing test and control questions within the GCS study, the Synovate study, and in a cross-study meta-analysis, Dr. Frederick rules out alternative explanations to the claim causing this effect, such as a preexisting belief that plastic is biodegradable.

### **a. The GCS study is an experimental survey with appropriate test and control groups.**

The GCS study is a classic experimental study. *Id.* at ¶ 8. Dr. Frederick asked various questions about biodegradation times for plastic bags, plastic containers, and plastic water bottles bearing unqualified “biodegradable” claims. *Id.* ¶¶ 8-10; CCX-860 at 30-45. He also asked identical (or nearly identical) questions about the same plastic items without the claim. *Id.* This design—test and control questions—is the essence of every experimental survey. *See* Frederick Decl. ¶¶ 6(b), 8.

Comparing the results of the GCS test and control questions demonstrates that a biodegradable label causes the number of consumers who perceive a false claim of breakdown in one year or less to at least double (and often more than quadruple). *Id.* ¶¶ 8-13. The label causes even more consumers to perceive a claim of break down within five years. *See id.* Specifically, after filtering out potential alternative explanations due to preexisting biases, guessing, or other factors, the data shows that the claim causes 22 to 41% of consumers to perceive a one-year breakdown claim and 32 to 58% to perceive a five-year claim:<sup>3</sup>

- **Plastic Bag**
  - **25%** of consumers (net of control) understand that a plastic bag labeled biodegradable will breakdown within **one year**. (Frederick Decl. Appendix A at 2, comparing control question (3P) to survey question (3K));
  - **32%** of consumers (net of control) understand that a plastic bag labeled biodegradable will completely breakdown within **five years**. (*Id.*);
- **Plastic Container**
  - **22%** of consumers (net of control) understand that a plastic container labeled biodegradable will breakdown within **one year**. (*Id.* at 1, comparing control question (3O) to survey question (3J));
  - **35%** of consumers (net of control) understand that a plastic container labeled biodegradable will breakdown within **five years**. (*Id.*);
- **Plastic Water Bottle**
  - **34 - 41%** of consumers (net of control) understand that a plastic water bottle labeled biodegradable will breakdown within **one year**. (*Id.* at 10-14, comparing control question (3N) to survey questions (3D) through (3G').)
  - **49 – 58%** of consumers (net of control) understand that a plastic water bottle labeled biodegradable will breakdown within **five years**. (*Id.*)

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<sup>3</sup> During oral argument, Commissioner Ohlhausen asked about the apparently small delta between the answers to Dr. Frederick's control questions and his test questions. This small delta results from an understandable but incorrect comparison. The control questions should not be compared to questions (3H) and (3I) because these questions displayed products whose logo was illegible to survey respondents. *See* Tr. 1151, 1153-54; Frederick Decl. ¶ 10 n.4.

**b. The Synovate study, though designed as an observational study, included a control-and-test-question pair.**

Although the Synovate study was largely observational, it asked a pair of questions that yield valid experimental evidence. Frederick Decl. ¶¶ 14-15. Specifically, Synovate #8 asked: “How many years do you think it takes for traditional plastic products to biodegrade?” CCX-860, Appendix A at 48. Synovate #19 asked: “What do you believe is a reasonable amount of time for a ‘biodegradable’ plastic package to decompose in a landfill?” *Id.* at 50. Synovate #8 functions as a control for #19 because it asked about “traditional plastic” rather than a “‘biodegradable’ plastic.” Frederick Decl. ¶¶ 15-16. The number of respondents who thought “biodegradable” plastic would decompose in less than ten years (87%) was **more than five times greater** than the number who thought “traditional” plastic would biodegrade in the same time period (16%), with a difference between test and control of 71%. *Id.*

Synovate #8 did not offer respondents the choice of “less than five years” like #19. CCX-860, Appendix C at 48-49. But, even assuming that every respondent who chose “less than ten years” in response to #8 would have opted for five years (if given the choice), the difference between five-year responses to #19 (70%) and assumed five-year response to #8 (*i.e.*, the 16% who selected ten years) is a still-remarkable 54%. CCX-860, Appendix C at 48-50; Frederick Decl. ¶¶ 15-16.

Given the magnitude of the difference between biodegradation times for “traditional” and “biodegradable” plastics, Dr. Frederick explains that these results demonstrate that the presence of a biodegradable claim on a plastic item causes a significant number of consumers believe it will break down in five years or less.<sup>4</sup> Frederick Decl. ¶¶16, 21.

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<sup>4</sup> Dr. Frederick explains that Synovate #8 is not a perfect control. Ideally, the control and test would use the same word (product *or* package), and would query respondents using the same

**c. APCO as a natural experimental survey.**

Researchers regularly use meta-analytic techniques to draw valid inferences from unintentionally manipulated variables across surveys using similar methodologies (sometimes referred to as a “natural experiment”). Frederick Decl. ¶ 6(c) (citing Rosenthal, 1991; Cooper, Hedges, & Valentine 2009; Hedges & Olkin, 2014; Lau, Ioannidis, & Schmid, 1998)). Thus, to the extent that there is incidental, unplanned variation in some variable(s), the studies can function like an experiment. *Id.* In other words, a question in one study can be treated as a control for a similar question in another study, where the two only vary slightly. Frederick Decl. ¶ 18.

For instance, compare GCS (3L) to APCO Q4:

- If a plastic package is NOT labeled “biodegradable,” how long will it take to decompose? (GCS 3L)
- If a package is labeled “biodegradable” what should be the maximum amount of time that it should take for that package to decompose? APCO Q4

Though not identical, the questions are similar. Therefore, GCS (3L) can act as a control for the APCO test question. Frederick Decl. ¶ 18. Comparing the GCS question to the APCO question shows the number of consumers who think that a product labeled biodegradable will biodegrade in one year and five years significantly increases when a “biodegradable” claim is made. *Id.*

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question stem (*i.e.*, “how many years do you think it takes” versus “what do you believe is a reasonable amount of time”). Frederick Decl. ¶ 15, n 7. Moreover, a better control would offer the respondents the same answer choices (*i.e.*, less than one, five, or ten years, etc. as #19 did rather than starting at “Less than 10 years” as #8 did). *Id.* Despite these imperfections, Dr. Frederick explains that the comparison of these questions yields valuable information, particularly given the magnitude of the differences between responses. *Id.*

GCS 3L vs. APCO #4			
Question Type	Wording	% of estimates	% of estimates
		≤ 1 year	≤ 5 years
Control (no claim)	<b>GCS (3L)</b> If a plastic package is NOT labeled “biodegradable,” how long will it take to decompose?	13%	17%
Biodegradable claim	<b>(APCO Q4)</b> If a package is labeled ‘biodegradable,’ what should be the maximum amount of time that it should take for that package to decompose?	60%	65%
<b>Difference</b>		<b>47%</b>	<b>48%</b>

Thus, this meta-analysis provides additional evidence that a “biodegradable” label is *causing* respondents to expect faster biodegradation.<sup>5</sup>

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<sup>5</sup> Moreover, several additional, different comparisons across studies may be made. For instance, one could evaluate how adding the word “plastic” before “package” affects consumers’ estimation of biodegradation times by comparing Synovate to APCO. Or one could look at the effect of referring to “something biodegradable” compared to “a plastic package,” a “package,” or a specific plastic product, *e.g.*, a bag, container, or water bottle. Some comparisons show some small effect, *e.g.*, consumers expect somewhat longer biodegradation times for *plastic* products, than for products whose composition is unspecified. While others show a much greater effect, *e.g.*, asking how many years versus “how many months” it takes to biodegrade. *See* Frederick Decl. ¶ 8. Dr. Frederick explains that having both “within-subject” and “between subject” comparisons is very instructive—here such comparisons also yield large differences in biodegradation times between plastics that do [or do not] bear biodegradable claims. *Id.* ¶ 6, n. 1 (*citing* Grice (1969) and Kahneman & Frederick (2002, 2005)).



**B. In light of the relevant legal authority and statistical methods, what weight should the Commission give to the results of descriptive surveys, which measure an attitude, characteristic, or belief that survey respondents hold, relative to the results of causal surveys or experimental surveys, which use test and control groups to measure the effect of a specific variable.**

The record’s observational surveys (APCO, Synovate, Dr. Stewart) corroborate the experimental evidence showing that biodegradable claims cause consumers to infer short biodegradation times of one to five years. As reasonably reliable and valid corroborating studies, the observational studies are entitled to substantial weight. *See* CC App. Br. at 10-11 (discussing reliability and validity of each).

Dr. Frederick explains that “observational studies can inform speculation, and revise assumptions.” Frederick Decl. ¶ 6(a). Although observational studies are not specifically designed to evaluate cause and effect, survey research experts routinely make causal inferences from observational data. Frederick Decl. ¶ 6(a); *see also id.* at ¶ 7 (discussing the value of all methods, including observational studies, but noting that the strongest inferences come from experiments (citing Salmon, 1998; Shadish, Cook, & Campbell, 2008)). Dr. Frederick explains that all of the *observational* evidence—APCO, Synovate, Dr. Stewart’s study—shows that consumers:

- believe that there are differences in how long it takes things to biodegrade. Frederick Decl. ¶¶ 14, 17, 19.
- infer short biodegradation times for items they consider biodegradable, such as paper, and long biodegradation times (including never) for traditional plastic items. *Id.*

- believe biodegradable products and packages are better for the environment—they are less burdensome on the environment generally and landfills specifically. *Id.* at ¶¶ 14-19.
- are willing to pay more for biodegradable products because of these positive attributes. *Id.* at 14.

Dr. Frederick concludes that from the data collected on various measures of consumer understanding of biodegradability, one can infer that the presence of a biodegradable label (cause) lowers consumers' estimates of biodegradation times (effect). Frederick Decl. ¶¶ 14, 17-22.

Collectively, these observational studies corroborate what the experimental studies demonstrate—consumers understand a “biodegradable” item will break down in a short time. This inference follows the Commission’s own view that the biodegradable claim causes consumers to infer short timeframes. 16 C.F.R. § 260.8; *cf. Kraft*, 970 F.2d at 319 (“[A]lternative or confirming extrinsic evidence which supplements rather than supplants the Commission’s expertise, includes adequately supported conclusions as to consumer responses to advertising by marketing experts”) (internal citations and quotations omitted). Thus, the observational evidence bolsters the conclusions of the experimental studies, and therefore the Commission should give them considerable weight. *Cf. POM Wonderful, LLC v. F.T.C.*, 777 F.3d 478, 502 (D.C. Cir. 2015) (observing that a researcher may draw conclusions from a single “blue ribbon test” (RCT) whose results are reinforced by observational studies). Dr. Frederick explains that the observational studies in the record (APCO, Synovate, and Dr. Stewart’s study) overwhelmingly demonstrate that consumers estimate short biodegradation times of one to five

years for items labeled biodegradable. *See* Frederick Decl. ¶¶ 21-23; *see also* CC App. Br. at 6-29.

**C. Is it possible to quantify the degree of convergence among the consumer surveys in the record in this case (APCO, Synovate, Frederick, and Stewart) or within any single survey? If so, please calculate the degree of convergence, if any, of these surveys. If not, please explain the significance of the inability to quantify convergence to an issue or issues on appeal.**

It is not possible to quantify the degree of convergence. Convergent validity refers to both the diversity and quantity of evidence for a claim or construct, and no single statistical metric of convergence or divergence encapsulates it. What is significant here is that four independent bodies of research all yield qualitatively similar results; in particular, they all show that consumers understand that items described as biodegradable will break down in a short time.

Convergent validity pertains to the presence (or absence) of consistent support for a construct or claim from a set of studies or measures that bear on it. Frederick Decl. ¶ 24 (citing Campbell & Fiske, 1959; Jacoby, 1978). This concept extends beyond technical procedures that exist to compare distributions or pool results from multiple studies<sup>6</sup> because it pertains both to the quantity and diversity of evidence that exists in support of a claim. *Id.* (citing Massey, 1951, Higgins & Thompson, 2002).

Convergent validity involves drawing inferences from a set of studies that have a theoretical relation to the construct of interest, *e.g.*, beliefs about biodegradation of materials which are [or are not] referred to as biodegradable. Convergent validity can provide powerful evidence—not only to researchers but also to courts—to validate the results of different studies, using different methodologies, conducted at different times by different researchers. *See, e.g., K.S. v. Fremont Unified School District*, 679 F.Supp.2d 1046, 1060 (N.D. Cal. 2010) (ALJ did

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<sup>6</sup> Dr. Frederick explains that there is considerable convergence in this narrower sense as well. Frederick Decl. ¶ 23, n.13.

not err by relying on expert’s convergent validity theory); *United States v. Montgomery*, No. 2:11-cr-20044-JPM-1, 2014 U.S. Dist. LEXIS 57689, at \*161 (W.D. Tenn. Jan. 28, 2014) (“[T]he Court is guided by the principle of ‘convergent validity,’ ‘consistent themes. . . . You want to look at all the pieces of evidence and try to come up with the most coherent explanation for the patterns that you see in the history.’”). The critical question is whether studies conducted differently (*e.g.*, for somewhat different purposes, using different numbers and types of questions, with somewhat different wording, given to somewhat different populations, at different times, by different researchers, using different media) *all* yield qualitatively similar result. Here, the answer is a resounding yes. Frederick Decl. ¶ 24 (explaining that the degree of convergent validity is high).

## II. Conclusion

For the reasons stated above, Respondent’s practices, as alleged in the Complaint, constitute unfair or deceptive acts or practices, in or affecting commerce, in violation of Sections 5(a) and 12 of the FTC Act. Complaint Counsel respectfully requests that the Commission enter the relief proposed in the Notice Order.

Respectfully Submitted,

/s/ Katherine Johnson

Katherine Johnson

Elisa Jillson

Dated: June 22, 2015

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**Counsel Supporting the Complaint**

**CERTIFICATE OF SERVICE**

I hereby certify that on June 22, 2015, I caused a true and correct copy of the foregoing to be served as follows:

One electronic copy and one copy through the FTC's e-filing system to the **Office of the Secretary:**

Donald S. Clark, Secretary  
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One electronic copy to the **Office of the Administrative Law Judge:**

The Honorable D. Michael Chappell  
Administrative Law Judge  
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UNITED STATES OF AMERICA  
BEFORE THE FEDERAL TRADE COMMISSION

COMMISSIONERS: Edith Ramirez, Chairwoman  
Julie Brill  
Maureen K. Ohlhausen  
Joshua D. Wright  
Terrell McSweeney

_____ )	
In the Matter of )	
ECM BioFilms, Inc., )	Docket No. 9358
a corporation, also d/b/a )	
Envioplastics International )	PUBLIC
_____ )	

**DECLARATION OF DR. SHANE FREDERICK IN SUPPORT OF  
COMPLAINT COUNSEL’S RESPONSE TO THE COMMISSION’S QUESTIONS**

In accordance with 28 U.S.C. § 1746, I declare under penalty of perjury that the following is true and correct:

1. I am over 18 years of age, and I am a citizen of the United States. I am a full Professor of Marketing at Yale University’s School of Management. See CCX-860 at 3-4 (summarizing education and experience); *id.* at Exh. A (curriculum vitae).

2. I have personal knowledge of the facts set forth in this declaration, which are relevant to three questions posed by the Federal Trade Commission.

**I. SUMMARY OF ANSWERS**

3. **Commission Questions 1 & 2.** The experimental evidence on record (my GCS studies, and a within-subject manipulation from the Synovate study) shows that large fractions of Americans (28% - 76%) believe that plastics which are called biodegradable will biodegrade quickly (within one or five years), and that far fewer (11% - 25%) hold such beliefs for plastic

products that lack such claims. The differences between the “test” and “control” questions can be interpreted as the fraction of consumers whose beliefs in rapid biodegradation are *caused* by the claim. The magnitude of this figure ranges from 18% -58%, depending on the exact comparison and whether one uses a one-year or five-year standard. The results from the other studies (APCO, Synovate, and Dr. Stewart’s), which were largely observational, further supports this conclusion.

4. To recapitulate, all evidence on record (both from controlled experimentation and from comparisons between studies) supports the following conclusion: most Americans believe that things that are advertised as or labeled biodegradable will biodegrade within five years, and a large minority (roughly a third) believe that will occur within one year. Far fewer do when such claims are not made. Thus, all of the evidence on record strongly supports the conclusion that affixing biodegradable labels to items that are not traditionally regarded as biodegradable (like plastic) *causes* a substantial fraction of consumers to think they will break down quickly.

5. **Commission Question 3.** Convergent validity refers to both the diversity and quantity of evidence for a claim or construct. No single statistical metric of convergence or divergence encapsulates it. What is significant here is that four independent bodies of research all yield qualitatively similar results; in particular, they all show that consumers understand that items described as biodegradable will break down in a short time.

## II. RESEARCH METHODOLOGIES FOR ASSESSING CONSUMER ATTITUDES

6. Consumer attitudes and beliefs can be investigated with several different methods, including observation, experiments, and meta-analyses.

- a. **Observational research** measures but does not manipulate variables. Like other forms of research, observational studies can inform speculation, and revise assumptions (Rosenbaum, 2002). For example, observational studies of consumer behavior have overturned prior assumptions that the conversion rate of a store approaches 100% (Underhill, 2009). The studies conducted by APCO and by Dr. Stewart were observational studies. They were intended to measure various aspects of respondents' beliefs about biodegradability, but all respondents received the same version of the survey and nothing was intentionally manipulated. The Synovate study also involved just one condition, and, thus, functioned primarily as an observational study. However, answers to pairs of the items within the survey could be compared, and thus, in some ways, this pair of items functioned like an experiment.<sup>1</sup> Observational research is not ideally suited for assessing causation, but one can make causal inferences by examining differences between different observational studies that measured similar things. These inferences can be rigorously tested with experimental research.

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<sup>1</sup> As discussed by Grice (1966), manipulating variables “within-subject” (comparing two answers of one respondent) may yield different results from manipulating variables “between-subject” (comparing two answers from respondents who received different versions). Indeed, it is often instructive to have both types of manipulations (Kahneman & Frederick, 2002, 2005). Synovate manipulates within subjects the variables that the Frederick studies manipulate between subjects. Both types of manipulations yield large differences between plastics that do [or do not] bear biodegradable claims.



- b. **Experimental research** manipulates as well as measures variables; it uses two or more conditions (e.g., a “test” question vs. a “control” question) to determine which factors affect the construct of interest (e.g., Shadish, Cook, & Campbell, 2002). In other words, experimental research is designed to explore cause and effect. My research using GCS was experimental research with “test” and “control” questions.<sup>2</sup> I deliberately manipulated various aspects of the questions posed to the same population of respondents.
- c. **Meta-analysis** draws inferences from analyses of multiple studies, which could include both observational and experimental studies (Rosenthal, 1991; Cooper, Hedges, & Valentine 2009; Hedges & Olkin, 2014; Lau, Ioannidis, & Schmid, 1998). In some cases, unintentional manipulation of a variable between two independent studies permits similar sorts of inferences as experimental research, which deliberately manipulates factors between conditions or between items in the same study. Attributions of cause are not as straightforward as with experimental research, since two independent studies typically differ in multiple ways, but meta-analyses reasonably permit inferences from all available relevant data.

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<sup>2</sup> As I noted in my initial report in this case, I routinely use GCS to conduct experiments for my academic research, including two of the studies reported in Frederick, Lee, & Baskin (2014). This paper was published in the *Journal of Marketing Research*, which is one of the most highly regarded in my field, and was selected as one of four finalists for the Paul Green award, which “recognizes the best article in the *Journal of Marketing Research* that demonstrates the greatest potential to contribute to the practice of marketing research.” See <http://www.themarketingfoundation.org/green.html>

7. All three types of research can be valuable. However, true experimental research enables the strongest tests of causation (Salmon, 1998; Shadish, Cook, & Campbell, 2002). Therefore, I will first address the experiments I conducted using GCS, before turning to the additional inferences that can be drawn from the Synovate, APCO, and Stewart studies.

### III. THE EFFECT OF A BIODEGRADABLE LABEL<sup>3</sup>

#### A. Experimental Evidence in Frederick's GCS Studies

8. My GCS-based studies were primarily experimental research; I manipulated variables to explore their effect on a construct of interest. The construct of interest in my studies was typically respondents' beliefs about the rate of biodegradation. I investigated the effect of various factors on these perceptions. Below I list the factors that (a) had little effect on these beliefs; (b) those that had some effect; and (c) those that had a substantial effect.

##### a. Little Effect on Beliefs about Biodegradation Rates

- i. The word used to reference the process in question. It does not matter significantly whether the process is called biodegradation, decomposition, or degradation (compare 1A, 1B, & 1C).
- ii. Whether the product is described being deposited in a landfill or not (compare 1E & 1F).<sup>4</sup>

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<sup>3</sup> I attach to this declaration as Appendix A the appendix to my initial expert report (CCX-860), which contains the results from the GCS study, the APCO study, and the Synovate study. I attach as Appendix B Dr. Stewart's survey data (which is Appendix D in his initial report, CCX-856). I attach as Appendix C a chart developed for this declaration, which highlights the difference between the test and control conditions.

<sup>4</sup> Question #8 in Synovate also finds little difference.

- iii. Whether the temporal interval is referenced as “how long” or “how much time” (compare 1B & 1D).
- iv. Whether the question is phrased as asking for an opinion or an objective fact (compare 1D & 1E and 3G & 3G’).
- v. Whether the object in question is a plastic “package” or a plastic “product” (compare 3A & 3B).
- vi. If a biodegradable label is present, the precise form it takes (compare 3D, 3E, 3F, & 3G).

**b. Some Effect on Beliefs about Biodegradation Rates**

- i. If asked the amount of time a package labeled biodegradable *should* take to biodegrade, consumers expect somewhat faster biodegradation rates than if asked how long it *would* take. Presumably the word *should* evokes more of a sense of what might be achievable under ideal conditions, whereas the word *would* evokes more of a sense of what it is reasonable to expect (given that the material might not be properly disposed, that the claims in question may be fallacious, and so on) (compare 1G & 1H).
- ii. Among products or packages bearing a biodegradable label, consumers expect somewhat longer biodegradation times for *plastic* products, than for products whose composition is unspecified (compare 1A & 3C; 1D & 3B).

c. **Substantial Effect on Beliefs of Biodegradation Rate**

- i. Although I mostly avoided such questions to avoid biasing the respondent, if a temporal unit is provided, shorter units (e.g., months) induce lower estimates than longer units (e.g., years). (Compare 1I with 1J)
- ii. Whether the package or product in question bears a biodegradable label or is otherwise claimed to be biodegradable. (Comparisons discussed next.)

9. By using various test and control questions, my experimental studies on GCS primarily explored the effect of this last factor—a biodegradable label. My studies revealed that biodegradable claims on a plastic product significantly increase the fraction of consumers who infer rapid breakdown of the material so labeled. These are not just *statistically* significant differences; they are *substantively* significant differences. The presence of a biodegradable label or claim often doubles or triples the fraction of respondents who believe the material in question will rapidly biodegrade.

10. I tested the effects of such claims on three items: (1) a thin white plastic bag (depicted), which was described as being made of plastic; (2) a plastic “Tupperware” container (depicted); and (3) a plastic water bottle (referenced). Some of the experimental materials used ECM’s logo, specifically, whereas others used other labels containing analogous “biodegradable” claims.<sup>5</sup>

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<sup>5</sup> Questions 3H and 3I were identical to 3J and 3K, but did not clarify in the question stem that the depicted logo says “ECM biodegradable.” The small font contained in the image of the label is not legible on many computer screens. Thus, I included these conditions to help ensure that the variable I intended to manipulate (the presence or absence of the label’s claim) was, in fact, being manipulated.

11. As shown in the tables below, biodegradable claims of any sort had marked effects on beliefs. (I show comparisons for both one and five years.)

<b>(1) "TUPPERWARE" CONTAINER (DEPICTED)</b>			
<b>Question Type</b>	<b>Wording</b>	<b>% of estimates less than 1 year</b>	<b>% of estimates less than 5 years</b>
Control (no claim)	<b>GCS (3O)</b> What is your best estimate of the amount of time it would take for the container below to biodegrade?	16%	21%
Biodegradable claim	<b>GCS (3J)</b> What is your best estimate of the amount of time it would take for this container (which bears the symbol "ECM biodegradable") to biodegrade?	34%	56%
<b>Difference between conditions</b>		<b>22%</b>	<b>35%</b>

<b>(2) PLASTIC BAG (DEPICTED)</b>			
<b>Question Type</b>	<b>Wording</b>	<b>% of estimates less than 1 year</b>	<b>% of estimates less than 5 years</b>
Control (no claim)	<b>GCS (3P)</b> What is your best estimate of the amount of time it would take for this plastic bag to biodegrade?	13%	25%
Biodegradable claim	<b>GCS (3K)</b> What is your best estimate of the amount of time it would take for this plastic bag (which bears the symbol "ECM biodegradable") to biodegrade?	38%	57%
<b>Difference between conditions</b>		<b>25%</b>	<b>32%</b>

<b>(3) PLASTIC WATER BOTTLE (REFERENCED)</b>			
<b>Question Type</b>	<b>Wording</b>	<b>% of estimates less than 1 year</b>	<b>% of estimates less than 5 years</b>
Control (no claim)	<b>GCS (3N)</b> How long would it take a plastic water bottle to compose	11%	18%
Biodegradable claim	<b>GCS (3D)</b> If you saw this label on a plastic water bottle, how long would it take to decompose? [label a pictured]	52%	70%
Biodegradable claim	<b>GCS (3E)</b> If you saw this label on a plastic water bottle, how long would it take to decompose? [label b pictured]	50%	67%
Biodegradable claim	<b>GCS (3F)</b> If you saw this label on a plastic water bottle, how long would it take to decompose? [label c pictured]	45%	68%
Biodegradable claim	<b>GCS (3G)</b> If you saw this label on a plastic water bottle, how long would it take to decompose? [label d pictured]	47%	71%
Biodegradable claim	<b>GCS (3G')</b> If you saw this label on a plastic water bottle, how long do you think it would take to decompose? [label d pictured]	52%	76%
<b>Difference between conditions</b>		<b>34 - 41%</b>	<b>49 - 58%</b>

12. Thus, these studies concerned the effects of biodegradable claims on respondents' estimates of time for a depicted or referenced plastic product. However, in the interest of construct validity (Cronbach & Meehl, 1955), I included other studies that asked different but conceptually related questions. When I manipulated whether a biodegradable claim was or was not made, I again found that the presence of a biodegradable label had marked effects. Consider, for example, the data below:

TUPPERWARE CONTAINER (DEPICTED)		
Question Type	Wording	Yes
Control (no claim)	<b>GCS (8A)</b> Will this container break down completely into elements found in nature?	18%
Biodegradable claim	<b>GCS (8C)</b> Will this container (which bears the symbol “ECM biodegradable”) break down completely into elements found in nature?	39%
<b>Difference between conditions</b>		<b>21%</b>

PLASTIC BAG (DEPICTED)		
Question Type	Wording	Yes
Control (no claim)	<b>GCS (9A)</b> Will this plastic bag break down completely into elements found in nature?	11%
Biodegradable claim	<b>GCS (9C)</b> Will this plastic bag (which bears the symbol “ECM biodegradable”) break down completely into elements found in nature?	45%
<b>Difference between conditions</b>		<b>34%</b>

13. Because the distribution of beliefs regarding products with biodegradable claims differs markedly from those lacking such claims, I can conclude that the biodegradable claim is *causing* that difference.<sup>6</sup>

<sup>6</sup> If such claims are false or unsubstantiated, it seems likely that consumers would feel deceived. To investigate this, I included sets of questions directed at the standards consumers believe should be met for products which bear a biodegradable label. The results are clear: though respondents adopted somewhat more permissive standards for plastic products than products of unspecified composition (compare 4A-4E with 2A-2E), the vast majority of responses indicate that respondents believe that deception has occurred if products advertised as biodegradable do not biodegrade within five years. Notably, it made little difference whether the question was framed from the perspective of a regulator (what a manufacturer should be *prohibited* from doing) or from the perspective of the manufacturer (what it should be *permitted* to do). To see this, compare 2D & 2E, as well as 4D & 4E.

## **B. Observational and Experimental Evidence in the Synovate Study.**

14. The study conducted by Synovate was predominantly an observational study investigating consumer's beliefs and attitudes regarding biodegradability, biodegradable plastics, and composting. Among other things, the Synovate study observed:

- 74% reported that biodegradable plastics will help reduce burden on landfills. (Synovate #16)
- 70% reported that a biodegradable plastic package could reasonably be expected to decompose in a landfill within five years. 25% thought that a reasonable amount of time was one year. (Synovate #19)
- 96% reported that they would prefer plastics that biodegrade in a landfill. (Synovate #20)
- The supporting information that consumers most wanted to see on packages labeled biodegradable was how long it would take to biodegrade. (Synovate #24)
- 72% reported that, at least occasionally, they look for eco-friendly packaging. (Synovate #25)
- Biodegradability was most frequently ranked as the most important attribute for lowering a product's burden on the environment—more important even than non-toxicity. (Synovate #25a)
- 42% reported they would be willing to pay at least 10% more for products that are less burdensome on the environment. (Synovate #27)

15. The Synovate study is not an experiment in the traditional sense of having two or more conditions (i.e., only one version of the survey was administered). However, two of the survey questions (#8 and #19) function as controls for each other, and thus, do permit a comparison.<sup>7</sup> Namely, when asked, “How many years do you think it takes for traditional plastic

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<sup>7</sup> The items are not *perfect* controls for each other. First, the context provided by other questions is not held constant (questions #9-18 could possibly affect responses to #19, but obviously not to #8). Second, the question stem differs (#8 asks: “How many years do you think it takes” whereas #9 asks: “What do you believe is a reasonable amount of time”). Third, the two questions reference slightly different things (products vs. package). Fourth, the response options are not constant. The shortest response option in #8 is “less than 10 years,” whereas in #19 the response options include “less than five years” and “less than one year.” However, with respect to this



products to biodegrade?” only 16% of respondents selected a response option shorter than ten years. However, when asked, “What do you believe is a reasonable amount of time for a ‘biodegradable’ plastic package to decompose in a landfill?” that number increased to 87%.

SYNOVATE #8 vs. #19				
Question Type	Wording	% of estimates less than 1 year	% of estimates less than 5 years	% of estimates less than 10 years
Control (no claim)	(Synovate #8) How many years do you think it takes for traditional plastic products to biodegrade?	NA	NA (though certainly ≤ 16%)	16%
Biodegradable claim	(Synovate #19) What do you believe is a reasonable amount of time for a “biodegradable” plastic package to decompose in a landfill?	25%	70%	87%
<b>Difference between conditions</b>			<b>54%<sup>8</sup></b>	<b>71%</b>

16. These two survey items effectively function as a within-subjects experiment, as the questions vary whether the plastic in question is traditional (Synovate #8) or biodegradable (Synovate #19). Over four times as many respondents thought plastic would decompose within five years if it was described as biodegradable (70% vs. 16%, see footnote 8).

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last point, part of what I regard as a flaw of the Synovate study actually strengthens the inferences that can be drawn. Synovate #19 appears intended to elicit long biodegradation times (especially as compared with the APCO study). Yet even here, respondents overwhelmingly expect biodegradable plastics to biodegrade quickly: 87% of respondents chose the one of the three shortest categories (<1, <5, <10 years), whereas only 13% chose one of the three longest (<20, <40, 40+ years).

<sup>8</sup> To permit this comparison, I am making the conservative assumption that every respondent who gave the response of less than ten years in Synovate #8 can be re-coded as less than five years.

### C. Observational Evidence from APCO Study (and more Meta-Analytic support)

17. The study commissioned by APCO was an observational study, which investigated respondents' beliefs and attitudes regarding biodegradability, composting, recycling, and so on. APCO made the following observations about consumer attitudes and beliefs regarding biodegradability:

- 83% thought that something labeled biodegradable will decompose in a landfill. 80% thought that something labeled biodegradable will decompose in one's backyard. (APCO #2)
- 65% reported that a package labeled biodegradable should decompose within four years. 60% thought it should decompose within one year. (APCO #4)<sup>9</sup>
- 83% reported that biodegradable packages will reduce landfill burdens. 79% reported that biodegradable packages will reduce pollution in oceans, rivers, and beaches. (APCO #7)

18. The APCO study is not experimental, but its results are amenable to meta-analytic techniques. One of my surveys—GCS (3L)—provides a useful comparison, as it is worded similarly to the APCO question minus the biodegradable claim. The comparison and results are below. Though this is not a true experiment, it provides additional evidence that a “biodegradable” label is *causing* respondents to expect faster biodegradation.

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<sup>9</sup> This question appears designed to elicit shorter response times than an analogous question in the Synovate study, because more of the response options are allocated to shorter time periods. However, one could simply compare the two most extreme response options to each other and note that more respondents selected “1 month or less” (19%) than five years or more (16%). One of my GCS studies used a nearly identical response format (see 1K), and I found similar results: again, more respondents selected 1 month or less (19%) than selected five years or more (6%).

GCS 3L vs. APCO #4			
Question Type	Wording	% of estimates ≤ 1 year	% of estimates ≤ 5 years
Control (no claim)	GCS (3L) If a plastic package is NOT labeled “biodegradable,” how long will it take to decompose?	13%	17%
Biodegradable claim	(APCO Q4) If a package is labeled ‘biodegradable,’ what should be the maximum amount of time that it should take for that package to decompose?	60%	65%
<b>Difference</b>		<b>47%</b>	<b>48%</b>

#### **D. Observational Evidence in Dr. Stewart’s Study**

19. Using a telephone landline survey, Dr. Stewart conducted observational research about how consumers interpret biodegradability and how they respond to various claims made by ECM. Dr. Stewart observed that:

- 98% (392/400) believe that there are differences in how long it takes things to biodegrade. (Stewart 4a).<sup>10</sup>
- 95% (378/400) believe that the biodegradability of a package is helpful to the environment.
- 75% (301/400) report that the biodegradability of a product or package is important to them.
- 64% (138/217) of those who produced codable responses<sup>11</sup> think that something “biodegradable” will biodegrade in five years or less, and 36% (79/217) think it will biodegrade in one year or less.<sup>12</sup>

<sup>10</sup> As demonstrated in several ways, the presence or absence of a label claiming “biodegradable” is one of the things that would affect such judgments.

### **E. Conclusions.**

20. All of the *observational* evidence on record—APCO, Synovate, Dr. Stewart’s study—shows that consumers desire more biodegradable plastics because they believe they are better for the environment. All of the *observational* evidence on record shows that consumers believe they understand what biodegradable means (98% in Dr. Stewart’s study; 99% in the Synovate study). All of the *observational* evidence on record shows that consumers reject the application of that term to products that do not biodegrade or which take a very long time to do so.

21. All of the *observational* evidence on record compels the inference that affixing biodegradable labels to things—like plastic—that are not traditionally regarded to be biodegradable, changes consumers beliefs about them.

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<sup>11</sup> I coded the verbatim responses from Dr. Stewart’s survey to obtain these numbers. For a detailed explanation of my coding methodology (i.e., coding any answer with a number and unit of time), see my initial report. CCX-860 at 12,14. I understand that Complaint Counsel also coded these data and found similar though not identical results (206 responses were coded, with 33% ≤ one year and 58% ≤ five years) and that Dr. Stewart accepted the 206 number at trial. Tr. 2779, 2790-91. Regardless of the exact numbers, the point remains the same—Dr. Stewart’s results concur with the other studies in the sense that a large fraction of people expect things that are referenced as biodegradable to do so within five or even one year.

<sup>12</sup> Dr. Stewart’s Q4 is vague—it does not specify the nature or composition of the “something” in question, nor whether that something bears a biodegradable label [or not]—so it is unsurprising that many respondents gave non-numeric responses, like “it depends.” However, several did explain their unwillingness to render a numeric estimate for this question by noting that different things take different lengths of time and in doing so many respondents specifically mentioned that traditional plastic does not biodegrade, or biodegrades more slowly than other things. For example:

- Respondent # 100515: “*Depends on the size and thickness of it, and depends on what it was made of. A piece of paper wouldn’t take as long as a piece of plastic.*”

22. All of the *experimental* evidence on record (my GCS studies, and a within-subject manipulation within the Synovate study) confirms the inference that the observational research compels—when affixed to plastic products, biodegradable labels *cause* consumers to assume more rapid biodegradation. Specifically, the evidence demonstrates that the biodegradable claims *cause* a substantial fraction of consumers to assume rapid biodegradation of that product (less than five years, or even one year).

#### IV. CONVERGENT VALIDITY

23. Convergent validity pertains to the presence (or absence) of consistent support for a construct or claim from a set of studies or measures that bear on it (Campbell & Fiske, 1959; Jacoby, 1978). This concept extends beyond technical procedures that exist to compare distributions or pool results from multiple studies (see, e.g., Massey, 1951; Higgins & Thompson, 2002)<sup>13</sup> as it pertains both to the quantity and diversity of evidence that exists in support of a claim.

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<sup>13</sup> There is considerable convergence here in this narrower sense as well. All of the research discussed here either directly elicited (APCO, Synovate, Frederick) or permitted (Stewart) quantitative responses regarding times required for biodegradation. Thus, these quantitative data can be plotted as distributions that can be compared and contrasted. These distributions overlap considerably; in particular, in all cases, most of their mass exists below five years. The distributions are not identical, of course, due to both sampling variability and other aspects of survey design that induce systematic differences, such as whether the response was open-ended (and thus continuous, at least in principle) or multichotomous (and, thereby, necessarily, discrete).

24. Convergent validity is high here because four studies conducted for somewhat different purposes, using different numbers and types of questions, with somewhat different wording, given to somewhat different populations, at different times, by different researchers, using different media (paper and pencil, phone, and internet) *all* yield qualitatively *similar* results: they *all* show that large proportions of respondents expect things called biodegradable to biodegrade, and to do so quickly.

Dated: June 22, 2015

A handwritten signature in black ink, appearing to read 'Shane Frederick', written over a horizontal line.

Dr. Shane Frederick

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products that lack such claims. The differences between the “test” and “control” questions can be interpreted as the fraction of consumers whose beliefs in rapid biodegradation are *caused* by the claim. The magnitude of this figure ranges from 18% -58%, depending on the exact comparison and whether one uses a one-year or five-year standard. The results from the other studies (APCO, Synovate, and Dr. Stewart’s), which were largely observational, further supports this conclusion.

4. To recapitulate, all evidence on record (both from controlled experimentation and from comparisons between studies) supports the following conclusion: most Americans believe that things that are advertised as or labeled biodegradable will biodegrade within five years, and a large minority (roughly a third) believe that will occur within one year. Far fewer do when such claims are not made. Thus, all of the evidence on record strongly supports the conclusion that affixing biodegradable labels to items that are not traditionally regarded as biodegradable (like plastic) *causes* a substantial fraction of consumers to think they will break down quickly.

5. **Commission Question 3.** Convergent validity refers to both the diversity and quantity of evidence for a claim or construct. No single statistical metric of convergence or divergence encapsulates it. What is significant here is that four independent bodies of research all yield qualitatively similar results; in particular, they all show that consumers understand that items described as biodegradable will break down in a short time.

## II. RESEARCH METHODOLOGIES FOR ASSESSING CONSUMER ATTITUDES

6. Consumer attitudes and beliefs can be investigated with several different methods, including observation, experiments, and meta-analyses.

- a. **Observational research** measures but does not manipulate variables. Like other forms of research, observational studies can inform speculation, and revise assumptions (Rosenbaum, 2002). For example, observational studies of consumer behavior have overturned prior assumptions that the conversion rate of a store approaches 100% (Underhill, 2009). The studies conducted by APCO and by Dr. Stewart were observational studies. They were intended to measure various aspects of respondents' beliefs about biodegradability, but all respondents received the same version of the survey and nothing was intentionally manipulated. The Synovate study also involved just one condition, and, thus, functioned primarily as an observational study. However, answers to pairs of the items within the survey could be compared, and thus, in some ways, this pair of items functioned like an experiment.<sup>1</sup> Observational research is not ideally suited for assessing causation, but one can make causal inferences by examining differences between different observational studies that measured similar things. These inferences can be rigorously tested with experimental research.

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<sup>1</sup> As discussed by Grice (1966), manipulating variables “within-subject” (comparing two answers of one respondent) may yield different results from manipulating variables “between-subject” (comparing two answers from respondents who received different versions). Indeed, it is often instructive to have both types of manipulations (Kahneman & Frederick, 2002, 2005). Synovate manipulates within subjects the variables that the Frederick studies manipulate between subjects. Both types of manipulations yield large differences between plastics that do [or do not] bear biodegradable claims.

- b. **Experimental research** manipulates as well as measures variables; it uses two or more conditions (e.g., a “test” question vs. a “control” question) to determine which factors affect the construct of interest (e.g., Shadish, Cook, & Campbell, 2002). In other words, experimental research is designed to explore cause and effect. My research using GCS was experimental research with “test” and “control” questions.<sup>2</sup> I deliberately manipulated various aspects of the questions posed to the same population of respondents.
- c. **Meta-analysis** draws inferences from analyses of multiple studies, which could include both observational and experimental studies (Rosenthal, 1991; Cooper, Hedges, & Valentine 2009; Hedges & Olkin, 2014; Lau, Ioannidis, & Schmid, 1998). In some cases, unintentional manipulation of a variable between two independent studies permits similar sorts of inferences as experimental research, which deliberately manipulates factors between conditions or between items in the same study. Attributions of cause are not as straightforward as with experimental research, since two independent studies typically differ in multiple ways, but meta-analyses reasonably permit inferences from all available relevant data.

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<sup>2</sup> As I noted in my initial report in this case, I routinely use GCS to conduct experiments for my academic research, including two of the studies reported in Frederick, Lee, & Baskin (2014). This paper was published in the *Journal of Marketing Research*, which is one of the most highly regarded in my field, and was selected as one of four finalists for the Paul Green award, which “recognizes the best article in the *Journal of Marketing Research* that demonstrates the greatest potential to contribute to the practice of marketing research.” See <http://www.themarketingfoundation.org/green.html>

7. All three types of research can be valuable. However, true experimental research enables the strongest tests of causation (Salmon, 1998; Shadish, Cook, & Campbell, 2002). Therefore, I will first address the experiments I conducted using GCS, before turning to the additional inferences that can be drawn from the Synovate, APCO, and Stewart studies.

### III. THE EFFECT OF A BIODEGRADABLE LABEL<sup>3</sup>

#### A. Experimental Evidence in Frederick's GCS Studies

8. My GCS-based studies were primarily experimental research; I manipulated variables to explore their effect on a construct of interest. The construct of interest in my studies was typically respondents' beliefs about the rate of biodegradation. I investigated the effect of various factors on these perceptions. Below I list the factors that (a) had little effect on these beliefs; (b) those that had some effect; and (c) those that had a substantial effect.

##### a. Little Effect on Beliefs about Biodegradation Rates

- i. The word used to reference the process in question. It does not matter significantly whether the process is called biodegradation, decomposition, or degradation (compare 1A, 1B, & 1C).
- ii. Whether the product is described being deposited in a landfill or not (compare 1E & 1F).<sup>4</sup>

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<sup>3</sup> I attach to this declaration as Appendix A the appendix to my initial expert report (CCX-860), which contains the results from the GCS study, the APCO study, and the Synovate study. I attach as Appendix B Dr. Stewart's survey data (which is Appendix D in his initial report, CCX-856). I attach as Appendix C a chart developed for this declaration, which highlights the difference between the test and control conditions.

<sup>4</sup> Question #8 in Synovate also finds little difference.

- iii. Whether the temporal interval is referenced as “how long” or “how much time” (compare 1B & 1D).
- iv. Whether the question is phrased as asking for an opinion or an objective fact (compare 1D & 1E and 3G & 3G’).
- v. Whether the object in question is a plastic “package” or a plastic “product” (compare 3A & 3B).
- vi. If a biodegradable label is present, the precise form it takes (compare 3D, 3E, 3F, & 3G).

**b. Some Effect on Beliefs about Biodegradation Rates**

- i. If asked the amount of time a package labeled biodegradable *should* take to biodegrade, consumers expect somewhat faster biodegradation rates than if asked how long it *would* take. Presumably the word *should* evokes more of a sense of what might be achievable under ideal conditions, whereas the word *would* evokes more of a sense of what it is reasonable to expect (given that the material might not be properly disposed, that the claims in question may be fallacious, and so on) (compare 1G & 1H).
- ii. Among products or packages bearing a biodegradable label, consumers expect somewhat longer biodegradation times for *plastic* products, than for products whose composition is unspecified (compare 1A & 3C; 1D & 3B).

c. **Substantial Effect on Beliefs of Biodegradation Rate**

- i. Although I mostly avoided such questions to avoid biasing the respondent, if a temporal unit is provided, shorter units (e.g., months) induce lower estimates than longer units (e.g., years). (Compare 1I with 1J)
- ii. Whether the package or product in question bears a biodegradable label or is otherwise claimed to be biodegradable. (Comparisons discussed next.)

9. By using various test and control questions, my experimental studies on GCS primarily explored the effect of this last factor—a biodegradable label. My studies revealed that biodegradable claims on a plastic product significantly increase the fraction of consumers who infer rapid breakdown of the material so labeled. These are not just *statistically* significant differences; they are *substantively* significant differences. The presence of a biodegradable label or claim often doubles or triples the fraction of respondents who believe the material in question will rapidly biodegrade.

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<b>(2) PLASTIC BAG (DEPICTED)</b>			
<b>Question Type</b>	<b>Wording</b>	<b>% of estimates less than 1 year</b>	<b>% of estimates less than 5 years</b>
Control (no claim)	<b>GCS (3P)</b> What is your best estimate of the amount of time it would take for this plastic bag to biodegrade?	13%	25%
Biodegradable claim	<b>GCS (3K)</b> What is your best estimate of the amount of time it would take for this plastic bag (which bears the symbol "ECM biodegradable") to biodegrade?	38%	57%
<b>Difference between conditions</b>		<b>25%</b>	<b>32%</b>

<b>(3) PLASTIC WATER BOTTLE (REFERENCED)</b>			
<b>Question Type</b>	<b>Wording</b>	<b>% of estimates less than 1 year</b>	<b>% of estimates less than 5 years</b>
Control (no claim)	<b>GCS (3N)</b> How long would it take a plastic water bottle to compose	11%	18%
Biodegradable claim	<b>GCS (3D)</b> If you saw this label on a plastic water bottle, how long would it take to decompose? [label a pictured]	52%	70%
Biodegradable claim	<b>GCS (3E)</b> If you saw this label on a plastic water bottle, how long would it take to decompose? [label b pictured]	50%	67%
Biodegradable claim	<b>GCS (3F)</b> If you saw this label on a plastic water bottle, how long would it take to decompose? [label c pictured]	45%	68%
Biodegradable claim	<b>GCS (3G)</b> If you saw this label on a plastic water bottle, how long would it take to decompose? [label d pictured]	47%	71%
Biodegradable claim	<b>GCS (3G')</b> If you saw this label on a plastic water bottle, how long do you think it would take to decompose? [label d pictured]	52%	76%
<b>Difference between conditions</b>		<b>34 - 41%</b>	<b>49 - 58%</b>

12. Thus, these studies concerned the effects of biodegradable claims on respondents' estimates of time for a depicted or referenced plastic product. However, in the interest of construct validity (Cronbach & Meehl, 1955), I included other studies that asked different but conceptually related questions. When I manipulated whether a biodegradable claim was or was not made, I again found that the presence of a biodegradable label had marked effects. Consider, for example, the data below:



TUPPERWARE CONTAINER (DEPICTED)		
Question Type	Wording	Yes
Control (no claim)	<b>GCS (8A)</b> Will this container break down completely into elements found in nature?	18%
Biodegradable claim	<b>GCS (8C)</b> Will this container (which bears the symbol “ECM biodegradable”) break down completely into elements found in nature?	39%
<b>Difference between conditions</b>		<b>21%</b>

PLASTIC BAG (DEPICTED)		
Question Type	Wording	Yes
Control (no claim)	<b>GCS (9A)</b> Will this plastic bag break down completely into elements found in nature?	11%
Biodegradable claim	<b>GCS (9C)</b> Will this plastic bag (which bears the symbol “ECM biodegradable”) break down completely into elements found in nature?	45%
<b>Difference between conditions</b>		<b>34%</b>

13. Because the distribution of beliefs regarding products with biodegradable claims differs markedly from those lacking such claims, I can conclude that the biodegradable claim is *causing* that difference.<sup>6</sup>

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<sup>6</sup> If such claims are false or unsubstantiated, it seems likely that consumers would feel deceived. To investigate this, I included sets of questions directed at the standards consumers believe should be met for products which bear a biodegradable label. The results are clear: though respondents adopted somewhat more permissive standards for plastic products than products of unspecified composition (compare 4A-4E with 2A-2E), the vast majority of responses indicate that respondents believe that deception has occurred if products advertised as biodegradable do not biodegrade within five years. Notably, it made little difference whether the question was framed from the perspective of a regulator (what a manufacturer should be *prohibited* from doing) or from the perspective of the manufacturer (what it should be *permitted* to do). To see this, compare 2D & 2E, as well as 4D & 4E.

## **B. Observational and Experimental Evidence in the Synovate Study.**

14. The study conducted by Synovate was predominantly an observational study investigating consumer's beliefs and attitudes regarding biodegradability, biodegradable plastics, and composting. Among other things, the Synovate study observed:

- 74% reported that biodegradable plastics will help reduce burden on landfills. (Synovate #16)
- 70% reported that a biodegradable plastic package could reasonably be expected to decompose in a landfill within five years. 25% thought that a reasonable amount of time was one year. (Synovate #19)
- 96% reported that they would prefer plastics that biodegrade in a landfill. (Synovate #20)
- The supporting information that consumers most wanted to see on packages labeled biodegradable was how long it would take to biodegrade. (Synovate #24)
- 72% reported that, at least occasionally, they look for eco-friendly packaging. (Synovate #25)
- Biodegradability was most frequently ranked as the most important attribute for lowering a product's burden on the environment—more important even than non-toxicity. (Synovate #25a)
- 42% reported they would be willing to pay at least 10% more for products that are less burdensome on the environment. (Synovate #27)

15. The Synovate study is not an experiment in the traditional sense of having two or more conditions (i.e., only one version of the survey was administered). However, two of the survey questions (#8 and #19) function as controls for each other, and thus, do permit a comparison.<sup>7</sup> Namely, when asked, “How many years do you think it takes for traditional plastic

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<sup>7</sup> The items are not *perfect* controls for each other. First, the context provided by other questions is not held constant (questions #9-18 could possibly affect responses to #19, but obviously not to #8). Second, the question stem differs (#8 asks: “How many years do you think it takes” whereas #9 asks: “What do you believe is a reasonable amount of time”). Third, the two questions reference slightly different things (products vs. package). Fourth, the response options are not constant. The shortest response option in #8 is “less than 10 years,” whereas in #19 the response options include “less than five years” and “less than one year.” However, with respect to this

products to biodegrade?” only 16% of respondents selected a response option shorter than ten years. However, when asked, “What do you believe is a reasonable amount of time for a ‘biodegradable’ plastic package to decompose in a landfill?” that number increased to 87%.

SYNOVATE #8 vs. #19				
Question Type	Wording	% of estimates less than 1 year	% of estimates less than 5 years	% of estimates less than 10 years
Control (no claim)	(Synovate #8) How many years do you think it takes for traditional plastic products to biodegrade?	NA	NA (though certainly ≤ 16%)	16%
Biodegradable claim	(Synovate #19) What do you believe is a reasonable amount of time for a “biodegradable” plastic package to decompose in a landfill?	25%	70%	87%
<b>Difference between conditions</b>			<b>54%<sup>8</sup></b>	<b>71%</b>

16. These two survey items effectively function as a within-subjects experiment, as the questions vary whether the plastic in question is traditional (Synovate #8) or biodegradable (Synovate #19). Over four times as many respondents thought plastic would decompose within five years if it was described as biodegradable (70% vs. 16%, see footnote 8).

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last point, part of what I regard as a flaw of the Synovate study actually strengthens the inferences that can be drawn. Synovate #19 appears intended to elicit long biodegradation times (especially as compared with the APCO study). Yet even here, respondents overwhelmingly expect biodegradable plastics to biodegrade quickly: 87% of respondents chose the one of the three shortest categories (<1, <5, <10 years), whereas only 13% chose one of the three longest (<20, <40, 40+ years).

<sup>8</sup> To permit this comparison, I am making the conservative assumption that every respondent who gave the response of less than ten years in Synovate #8 can be re-coded as less than five years.

### C. Observational Evidence from APCO Study (and more Meta-Analytic support)

17. The study commissioned by APCO was an observational study, which investigated respondents' beliefs and attitudes regarding biodegradability, composting, recycling, and so on. APCO made the following observations about consumer attitudes and beliefs regarding biodegradability:

- 83% thought that something labeled biodegradable will decompose in a landfill. 80% thought that something labeled biodegradable will decompose in one's backyard. (APCO #2)
- 65% reported that a package labeled biodegradable should decompose within four years. 60% thought it should decompose within one year. (APCO #4)<sup>9</sup>
- 83% reported that biodegradable packages will reduce landfill burdens. 79% reported that biodegradable packages will reduce pollution in oceans, rivers, and beaches. (APCO #7)

18. The APCO study is not experimental, but its results are amenable to meta-analytic techniques. One of my surveys—GCS (3L)—provides a useful comparison, as it is worded similarly to the APCO question minus the biodegradable claim. The comparison and results are below. Though this is not a true experiment, it provides additional evidence that a “biodegradable” label is *causing* respondents to expect faster biodegradation.

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<sup>9</sup> This question appears designed to elicit shorter response times than an analogous question in the Synovate study, because more of the response options are allocated to shorter time periods. However, one could simply compare the two most extreme response options to each other and note that more respondents selected “1 month or less” (19%) than five years or more (16%). One of my GCS studies used a nearly identical response format (see 1K), and I found similar results: again, more respondents selected 1 month or less (19%) than selected five years or more (6%).

GCS 3L vs. APCO #4			
Question Type	Wording	% of estimates ≤ 1 year	% of estimates ≤ 5 years
Control (no claim)	GCS (3L) If a plastic package is NOT labeled “biodegradable,” how long will it take to decompose?	13%	17%
Biodegradable claim	(APCO Q4) If a package is labeled ‘biodegradable,’ what should be the maximum amount of time that it should take for that package to decompose?	60%	65%
<b>Difference</b>		<b>47%</b>	<b>48%</b>

#### **D. Observational Evidence in Dr. Stewart’s Study**

19. Using a telephone landline survey, Dr. Stewart conducted observational research about how consumers interpret biodegradability and how they respond to various claims made by ECM. Dr. Stewart observed that:

- 98% (392/400) believe that there are differences in how long it takes things to biodegrade. (Stewart 4a).<sup>10</sup>
- 95% (378/400) believe that the biodegradability of a package is helpful to the environment.
- 75% (301/400) report that the biodegradability of a product or package is important to them.
- 64% (138/217) of those who produced codable responses<sup>11</sup> think that something “biodegradable” will biodegrade in five years or less, and 36% (79/217) think it will biodegrade in one year or less.<sup>12</sup>

<sup>10</sup> As demonstrated in several ways, the presence or absence of a label claiming “biodegradable” is one of the things that would affect such judgments.

### **E. Conclusions.**

20. All of the *observational* evidence on record—APCO, Synovate, Dr. Stewart’s study—shows that consumers desire more biodegradable plastics because they believe they are better for the environment. All of the *observational* evidence on record shows that consumers believe they understand what biodegradable means (98% in Dr. Stewart’s study; 99% in the Synovate study). All of the *observational* evidence on record shows that consumers reject the application of that term to products that do not biodegrade or which take a very long time to do so.

21. All of the *observational* evidence on record compels the inference that affixing biodegradable labels to things—like plastic—that are not traditionally regarded to be biodegradable, changes consumers beliefs about them.

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<sup>11</sup> I coded the verbatim responses from Dr. Stewart’s survey to obtain these numbers. For a detailed explanation of my coding methodology (i.e., coding any answer with a number and unit of time), see my initial report. CCX-860 at 12,14. I understand that Complaint Counsel also coded these data and found similar though not identical results (206 responses were coded, with 33% ≤ one year and 58% ≤ five years) and that Dr. Stewart accepted the 206 number at trial. Tr. 2779, 2790-91. Regardless of the exact numbers, the point remains the same—Dr. Stewart’s results concur with the other studies in the sense that a large fraction of people expect things that are referenced as biodegradable to do so within five or even one year.

<sup>12</sup> Dr. Stewart’s Q4 is vague—it does not specify the nature or composition of the “something” in question, nor whether that something bears a biodegradable label [or not]—so it is unsurprising that many respondents gave non-numeric responses, like “it depends.” However, several did explain their unwillingness to render a numeric estimate for this question by noting that different things take different lengths of time and in doing so many respondents specifically mentioned that traditional plastic does not biodegrade, or biodegrades more slowly than other things. For example:

- Respondent # 100515: “*Depends on the size and thickness of it, and depends on what it was made of. A piece of paper wouldn’t take as long as a piece of plastic.*”

22. All of the *experimental* evidence on record (my GCS studies, and a within-subject manipulation within the Synovate study) confirms the inference that the observational research compels—when affixed to plastic products, biodegradable labels *cause* consumers to assume more rapid biodegradation. Specifically, the evidence demonstrates that the biodegradable claims *cause* a substantial fraction of consumers to assume rapid biodegradation of that product (less than five years, or even one year).

#### IV. CONVERGENT VALIDITY

23. Convergent validity pertains to the presence (or absence) of consistent support for a construct or claim from a set of studies or measures that bear on it (Campbell & Fiske, 1959; Jacoby, 1978). This concept extends beyond technical procedures that exist to compare distributions or pool results from multiple studies (see, e.g., Massey, 1951; Higgins & Thompson, 2002)<sup>13</sup> as it pertains both to the quantity and diversity of evidence that exists in support of a claim.

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<sup>13</sup> There is considerable convergence here in this narrower sense as well. All of the research discussed here either directly elicited (APCO, Synovate, Frederick) or permitted (Stewart) quantitative responses regarding times required for biodegradation. Thus, these quantitative data can be plotted as distributions that can be compared and contrasted. These distributions overlap considerably; in particular, in all cases, most of their mass exists below five years. The distributions are not identical, of course, due to both sampling variability and other aspects of survey design that induce systematic differences, such as whether the response was open-ended (and thus continuous, at least in principle) or multichotomous (and, thereby, necessarily, discrete).

24. Convergent validity is high here because four studies conducted for somewhat different purposes, using different numbers and types of questions, with somewhat different wording, given to somewhat different populations, at different times, by different researchers, using different media (paper and pencil, phone, and internet) *all* yield qualitatively *similar* results: they *all* show that large proportions of respondents expect things called biodegradable to biodegrade, and to do so quickly.

Dated: June 22, 2015

A handwritten signature in black ink, appearing to read 'Shane Frederick', written over a horizontal line.

Dr. Shane Frederick



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APPENDIX A (Amended)

Key: **N=Coded Responses** [uncoded responses] **median response time in seconds, response rate**

Google Surveys Studies

**Generic Products & Packages**

(1A) If a package is labeled "biodegradable," how long will it take to decompose? **N=996** [705] **18.6s, 23.7%**

≤1 year	≤ 5 years	≤ 10 years	≤ 25 years	≤ 100 years
53% <sub>0530</sub>	71% <sub>0710</sub>	82% <sub>0820</sub>	87% <sub>0866</sub>	93% <sub>0926</sub>

(1B) If a package is labeled "biodegradable," how long will it take to biodegrade? **N=944** [759] **18.4s, 22.1%**

≤1 year	≤ 5 years	≤ 10 years	≤ 25 years	≤ 100 years
51% <sub>0481</sub>	70% <sub>0663</sub>	83% <sub>0785</sub>	87% <sub>0822</sub>	94% <sub>0886</sub>

(1C) If a package is labeled "biodegradable," how long will it take to degrade? **N=1007** [694] **17.7s, 23.1%**

≤1 year	≤ 5 years	≤ 10 years	≤ 25 years	≤ 100 years
53% <sub>0535</sub>	71% <sub>0718</sub>	83% <sub>0834</sub>	87% <sub>0881</sub>	93% <sub>0935</sub>

(1D) How much time do you think it would take a biodegradable product to biodegrade?

**N=138** [70] **15.4s, 22.0%**

≤1 year	≤ 5 years	≤ 10 years	≤ 25 years	≤ 100 years
47% <sub>064</sub>	66% <sub>091</sub>	84% <sub>0115</sub>	89% <sub>0122</sub>	98% <sub>0134</sub>

(1E) How much time would it take a biodegradable product to biodegrade? **N=119** [95] **18.2s, 23.2%**

≤1 year	≤ 5 years	≤ 10 years	≤ 25 years	≤ 100 years
50% <sub>059</sub>	71% <sub>084</sub>	85% <sub>0101</sub>	89% <sub>0106</sub>	96% <sub>0114</sub>

(1F) How much time would it take a biodegradable product to biodegrade in a landfill?

**N=116** [85] **18.3s, 21.7%**

≤1 year	≤ 5 years	≤ 10 years	≤ 25 years	≤ 100 years
42% <sub>049</sub>	70% <sub>082</sub>	84% <sub>098</sub>	88% <sub>0103</sub>	94% <sub>0110</sub>

(1G) If a package is labeled "biodegradable," what should be the maximum amount of time that it should take for that package to decompose?<sup>1</sup> **N=1374** [532] **20.0s, 22.3%**

≤1 year	≤ 5 years	≤ 10 years	≤ 25 years	≤ 100 years
74% <sub>01014</sub>	89% <sub>01225</sub>	95% <sub>01302</sub>	96% <sub>01319</sub>	98% <sub>01342</sub>

(1H) If a package is labeled "biodegradable," what would be the maximum amount of time that it would take for that package to decompose? **N=1272** [629] **19.9s, 22.1%**

≤1 year	≤ 5 years	≤ 10 years	≤ 25 years	≤ 100 years
60% <sub>0760</sub>	79% <sub>01001</sub>	89% <sub>01126</sub>	92% <sub>01167</sub>	97% <sub>01229</sub>

(1I) If a package is labeled "biodegradable," how many months will it take to biodegrade?  
**N=1704** [0] **15.7s, 25.9%**

≤1 year	≤ 5 years	≤ 10 years	≤ 25 years	≤ 100 years
76% <sub>01297</sub>	91% <sub>01553</sub>	96% <sub>01629</sub>	96% <sub>01642</sub>	98% <sub>01668</sub>

(1J) If a package is labeled "biodegradable," how many years will it take to biodegrade?  
**N=1700** [0] **15.8s, 25.8%**

≤1 year	≤ 5 years	≤ 10 years	≤ 25 years	≤ 100 years
25% <sub>0422</sub>	57% <sub>0974</sub>	80% <sub>01356</sub>	88% <sub>01494</sub>	96% <sub>01624</sub>

(1K) If a package is labeled "biodegradable," what should be the maximum amount of time that it should take for that package to decompose? **N=1902** [0] **12.0s, 35.3%**

1 month or less	1 month-1 year	1-5 years	5 years or more	unsure
14% <sub>0275</sub>	23% <sub>0439</sub>	17% <sub>0325</sub>	6% <sub>0117</sub>	39% <sub>0746</sub>

<sup>1</sup> In surveys 1G, 1H, and 1K, we inadvertently repeated the article "the" (e. g.,... what would be the the maximum amount of time...). After making the correction, we conducted these surveys again to determine whether this mattered. It didn't. We report the pooled data.

(2A) Federal regulators should not permit a product to be labeled 'biodegradable' unless it biodegrades within this period of time. **N=134** <sup>[84]</sup> **22.0s, 17.2%**

≤1 year	≤ 5 years	≤ 10 years	≤ 25 years	≤ 100 years
62% <sub>083</sub>	85% <sub>0114</sub>	94% <sub>0126</sub>	98% <sub>0131</sub>	99% <sub>0133</sub>

(2B) I'd feel misled if I learned that a product labeled "biodegradable," took longer than this to biodegrade. **N=740** <sup>[963]</sup> **22.4s, 20.6%**

≤1 year	≤ 5 years	≤ 10 years	≤ 25 years	≤ 100 years
63% <sub>0466</sub>	87% <sub>0645</sub>	94% <sub>0700</sub>	96% <sub>0715</sub>	98% <sub>0727</sub>

(2C) I'd consider it misleading to label a product "biodegradable," if it failed to fully degrade within this amount of time. **N=845** <sup>[859]</sup> **21.2s, 22.6%**

≤1 year	≤ 5 years	≤ 10 years	≤ 25 years	≤ 100 years
64% <sub>0539</sub>	84% <sub>0714</sub>	93% <sub>0784</sub>	96% <sub>0811</sub>	98% <sub>0828</sub>

(2D) A company should not be allowed to label its packaging material as "biodegradable" unless it biodegrades within what period of time? **N=142** <sup>[58]</sup> **22.7s, 21.7%**

≤1 year	≤ 5 years	≤ 10 years	≤ 25 years	≤ 100 years
71% <sub>0102</sub>	89% <sub>0127</sub>	94% <sub>0133</sub>	95% <sub>0135</sub>	97% <sub>0138</sub>

(2E) A company should be allowed to label its packaging material as "biodegradable" if it biodegrades within what period of time? **N=154** <sup>[47]</sup> **21.1s, 24.9%**

≤1 year	≤ 5 years	≤ 10 years	≤ 25 years	≤ 100 years
71% <sub>0109</sub>	92% <sub>0141</sub>	95% <sub>0146</sub>	97% <sub>0149</sub>	99% <sub>0153</sub>

**Plastic Products & Packages**

(3A) Suppose a plastic package is labeled biodegradable. How long do you think it will take to biodegrade? **N=154** [55] **18.1s, 23.7%**

≤1 year	≤ 5 years	≤ 10 years	≤ 25 years	≤ 100 years
31% <sub>048</sub>	56% <sub>086</sub>	77% <sub>0119</sub>	85% <sub>0131</sub>	94% <sub>0144</sub>

(3B) Suppose a plastic product is labeled biodegradable. How much time do you think it would take to biodegrade? **N=158** [66] **17.6s, 24.6%**

≤1 year	≤ 5 years	≤ 10 years	≤ 25 years	≤ 100 years
28% <sub>044</sub>	47% <sub>074</sub>	62% <sub>099</sub>	72% <sub>0114</sub>	91% <sub>0144</sub>

(3C) If a plastic package is labeled "biodegradable," how long will it take to decompose? **N=144** [82] **20.2s, 19.2%**

≤1 year	≤ 5 years	≤ 10 years	≤ 25 years	≤ 100 years
44% <sub>064</sub>	64% <sub>092</sub>	77% <sub>0111</sub>	83% <sub>0120</sub>	93% <sub>0134</sub>

(3D) If you saw this label on a plastic water bottle, how long would it take to decompose? **N=141** [59] **22.2s, 19.7%**



≤1 year	≤ 5 years	≤ 10 years	≤ 25 years	≤ 100 years
52% <sub>074</sub>	70% <sub>099</sub>	79% <sub>0112</sub>	86% <sub>0121</sub>	91% <sub>0129</sub>

(3E) If you saw this label on a plastic water bottle, how long would it take to decompose? **N=147** [78] **20.9s, 22.3%**



≤1 year	≤ 5 years	≤ 10 years	≤ 25 years	≤ 100 years
50% <sub>074</sub>	67% <sub>099</sub>	78% <sub>0116</sub>	80% <sub>0119</sub>	89% <sub>0132</sub>

(3F) If you saw this label on a plastic water bottle, how long would it take to decompose? **N=140** [76] **22.1s, 20.3%**



≤1 year	≤ 5 years	≤ 10 years	≤ 25 years	≤ 100 years
45% <sub>063</sub>	68% <sub>095</sub>	79% <sub>0110</sub>	84% <sub>0117</sub>	93% <sub>0130</sub>

(3G) If you saw this label on a plastic water bottle, how long would it take to decompose?

N=163 [63] 22.8s, 17.3%



≤1 year	≤ 5 years	≤ 10 years	≤ 25 years	≤ 100 years
47% <sub>077</sub>	71% <sub>0116</sub>	79% <sub>0129</sub>	85% <sub>0139</sub>	88% <sub>0144</sub>

(3G') If you saw this label on a plastic water bottle, how long do you think it would take to decompose?

N=164 [59] 24.9s, 20.8%



≤1 year	≤ 5 years	≤ 10 years	≤ 25 years	≤ 100 years
52% <sub>085</sub>	76% <sub>0124</sub>	83% <sub>0136</sub>	88% <sub>0144</sub>	93% <sub>0153</sub>

(3H) What is your best estimate of the amount of time it would take for this container to biodegrade?

N=171 [44] 21.6s, 22.1%



≤1 year	≤ 5 years	≤ 10 years	≤ 25 years	≤ 100 years
22% <sub>038</sub>	40% <sub>069</sub>	51% <sub>088</sub>	61% <sub>0105</sub>	80% <sub>0136</sub>

(3I) What is your best estimate of the amount of time it would take for this plastic bag to biodegrade?  
 N=202 [66] 20.1s, 24.8%



≤1 year	≤ 5 years	≤ 10 years	≤ 25 years	≤ 100 years
20% <sub>041</sub>	40% <sub>081</sub>	51% <sub>0104</sub>	60% <sub>0122</sub>	83% <sub>0167</sub>

(3J) What is your best estimate of the amount of time it would take for this container (which bears the symbol “ECM biodegradable”) to biodegrade? N=171 [45] 21.6s, 24.5%



≤1 year	≤ 5 years	≤ 10 years	≤ 25 years	≤ 100 years
34% <sub>058</sub>	56% <sub>096</sub>	70% <sub>0119</sub>	78% <sub>0134</sub>	92% <sub>0157</sub>



**3K)** What is your best estimate of the amount of time it would take for this plastic bag (which bears the symbol “ECM biodegradable”) to biodegrade? **N=176** [66] **22.0s, 21.3%**



≤1 year	≤ 5 years	≤ 10 years	≤ 25 years	≤ 100 years
38% <sub>067</sub>	57% <sub>099</sub>	71% <sub>0125</sub>	79% <sub>0139</sub>	90% <sub>0158</sub>

**Plastic Products Control Conditions (no biodegradable claim)**

**(3L)** If a plastic package is NOT labeled "biodegradable," how long will it take to decompose?  
**N=127** [73] **22.2s, 21.2%**

≤1 year	≤ 5 years	≤ 10 years	≤ 25 years	≤ 100 years
13% <sub>017</sub>	17% <sub>022</sub>	34% <sub>044</sub>	41% <sub>052</sub>	58% <sub>074</sub>

**(3M)** How long does it take a plastic package to decompose?  
**N=139** [85] **17.2s, 22.3%**

≤1 year	≤ 5 years	≤ 10 years	≤ 25 years	≤ 100 years
14% <sub>019</sub>	22% <sub>030</sub>	29% <sub>040</sub>	38% <sub>053</sub>	65% <sub>091</sub>

**(3N)** How long would it take a plastic water bottle to decompose?  
**N=158** [64] **16.3s, 22.0%**

≤1 year	≤ 5 years	≤ 10 years	≤ 25 years	≤ 100 years
11% <sub>018</sub>	18% <sub>029</sub>	30% <sub>048</sub>	41% <sub>065</sub>	61% <sub>097</sub>

**(30)** What is your best estimate of the amount of time it would take for the container below to biodegrade?

**N=163** [52] **18.6s, 25.2%**



≤ 1 year	≤ 5 years	≤ 10 years	≤ 25 years	≤ 100 years
16% <sub>026</sub>	21% <sub>034</sub>	32% <sub>052</sub>	43% <sub>070</sub>	62% <sub>0101</sub>

**(3P)** What is your best estimate of the amount of time it would take for this plastic bag to biodegrade?

**N=202** [41] **20.1s, 21.5%**



≤ 1 year	≤ 5 years	≤ 10 years	≤ 25 years	≤ 100 years
13% <sub>027</sub>	25% <sub>050</sub>	40% <sub>081</sub>	50% <sub>0101</sub>	76% <sub>0153</sub>

**Qualified claims (3Q & 3R) & reactions to unqualified claims (4A...4E)**

(3Q) Suppose a plastic package is labeled biodegradable, and is claimed to biodegrade in “*nine months to five years.*” What is your best estimate of the amount of time it will take to biodegrade?<sup>2</sup>

**N=345** [138] **22.9s, 21.1%**

<1 year	1 year	1 < x ≤ 2	2 < x ≤ 3	3 < x ≤ 4	4 < x ≤ 5	5 < x ≤ 10	10 < x ≤ 25	25 < x ≤ 100	100 years+
6% <sub>019</sub>	7% <sub>025</sub>	4% <sub>015</sub>	14% <sub>048</sub>	3% <sub>012</sub>	45% <sub>0156</sub>	9% <sub>031</sub>	2% <sub>08</sub>	3% <sub>09</sub>	6% <sub>022</sub>

(3R) Suppose a plastic package is labeled biodegradable, and is claimed to biodegrade in “*some period greater than a year.*” What is your best estimate of the amount of time it will take to biodegrade?

**N=296** [183] **22.2s, 21.9%**

<1 year	1 year	1 < x ≤ 2	2 < x ≤ 3	3 < x ≤ 4	4 < x ≤ 5	5 < x ≤ 10	10 < x ≤ 25	25 < x ≤ 100	100 years+
6% <sub>018</sub>	7% <sub>022</sub>	16% <sub>047</sub>	7% <sub>021</sub>	2% <sub>05</sub>	16% <sub>046</sub>	19% <sub>056</sub>	8% <sub>023</sub>	11% <sub>033</sub>	8% <sub>025</sub>

\*\*\*\*\*

(4A) Federal regulators should not permit a plastic product to be labeled “biodegradable” unless it biodegrades within what amount of time? **N=229** [45] **22.7s, 33.1%**

≤ 1 year	≤ 5 years	≤ 10 years	≤ 25 years	≤ 100 years
63% <sub>0145</sub>	84% <sub>0193</sub>	93% <sub>0214</sub>	97% <sub>0222</sub>	100% <sub>0229</sub>

(4B) I’d feel misled if I learned that a plastic product labeled “biodegradable,” took longer than what amount of time to biodegrade? **N=150** [97] **25.6s, 32.3%**

≤ 1 year	≤ 5 years	≤ 10 years	≤ 25 years	≤ 100 years
53% <sub>080</sub>	77% <sub>0115</sub>	86% <sub>0129</sub>	88% <sub>0132</sub>	95% <sub>0142</sub>

(4C) I’d consider it misleading to label a plastic product “biodegradable,” if it failed to fully degrade within what amount of time? **N=198** [60] **22.3s, 33.3%**

≤ 1 year	≤ 5 years	≤ 10 years	≤ 25 years	≤ 100 years
60% <sub>0118</sub>	85% <sub>0168</sub>	94% <sub>0187</sub>	96% <sub>0191</sub>	99% <sub>0196</sub>

(4D) A company should not be allowed to label its plastic packaging material as “biodegradable” unless it biodegrades within what amount of time? **N=232** [64] **21.7s, 30.6%**

≤ 1 year	≤ 5 years	≤ 10 years	≤ 25 years	≤ 100 years
62% <sub>0144</sub>	86% <sub>0200</sub>	92% <sub>0214</sub>	95% <sub>0220</sub>	97% <sub>0226</sub>

(4E) A company should be allowed to label its plastic packaging material as “biodegradable” if it biodegrades within what amount of time? **N=201** [55] **21.6s, 33.0%**

≤ 1 year	≤ 5 years	≤ 10 years	≤ 25 years	≤ 100 years
68% <sub>0137</sub>	91% <sub>0182</sub>	98% <sub>0197</sub>	99% <sub>0198</sub>	100% <sub>0200</sub>

<sup>2</sup> We tested whether setting the claim in italics and quotes (as here) affected estimates. It had no discernable effect, so we pooled across those conditions. (The data is disaggregated in the raw data files.)

5A) How much longer would it take for the bag on the right to biodegrade? Enter your estimate below.

N=157 [102] 22.2s, 23.7%



≤1 year	≤ 5 years	≤ 10 years	≤ 25 years	≤ 100 years
32% <sub>050</sub>	48% <sub>076</sub>	63% <sub>099</sub>	71% <sub>0111</sub>	83% <sub>0130</sub>

(5B) How much more quickly would the bag on the right biodegrade? Enter your estimate below.

N=72 [145]\* 23.3s, 17.2%



≤1 year	≤ 5 years	≤ 10 years	≤ 25 years	≤ 100 years
59% <sub>043</sub>	78% <sub>057</sub>	82% <sub>060</sub>	86% <sub>063</sub>	89% <sub>065</sub>

\*Fifteen people in this condition expressed their comparison as a *ratio* rather than a *difference* in time required for biodegradation. They thought the bag on the right would biodegrade [50% faster; twice as fast (3); three times as fast(2), 5/8/10/10/15/23/30/75/99 times as fast].

## BINARY QUESTIONS

(6) Will a biodegradable container break down completely into elements found in nature?

Yes	No
41% <sub>138</sub>	
12.0s, 30.7%	

(7) Will a container labeled biodegradable break down completely into elements found in nature?

Yes	No
41% <sub>116</sub>	
10.4s, 27.2%	

(8A) Will this container break down completely into elements found in nature?

Yes	No
18% <sub>141</sub>	
11.3s, 33.1%	



(8B) Will this container break down completely into elements found in nature?

Yes	No
37% <sub>148</sub>	
11.0s, 33.3%	



(8C) Will this container (which bears the symbol "ECM biodegradable") break down completely into elements found in nature?

Yes	No
39% <sub>158</sub>	
13.4s, 29.7%	



(9A) Will this plastic bag break down completely into elements found in nature?<sup>3</sup>

Yes	No
11% <sub>128</sub>	
7.8s,	32.7%



---

<sup>3</sup> I also ran three conditions in which the word *completely* was removed. The results were essentially unchanged (values of 15%<sub>100</sub>, 39%<sub>103</sub>, and 50%<sub>100</sub> for questions 9A, 9B, and 9C, respectively). In the concatenated data set,

(9B) Will this plastic bag break down completely into elements found in nature?

Yes	No
42% <sub>146</sub>	
11.9s, 35.5%	





(9C) Will this plastic bag (which bears the symbol "ECM biodegradable") break down completely into elements found in nature?

Yes	No
45% <sub>135</sub>	
12.2s, 25.9%	



(10A) Will this plastic bag biodegrade in a landfill?

Yes	No
21% <sub>139</sub>	8.8s, 33.3%



(10B) Will this plastic bag biodegrade in a landfill? **Yes** **No**  
**42%**<sup>137</sup>  
**9.9s, 30.6%**



(11) Which bag will biodegrade faster?



**79%**<sup>112</sup>  
**10.2s, 22.8%**

(12A) Suppose a plastic package is labeled biodegradable, and is claimed to biodegrade in “*nine months to five years.*” Will it biodegrade in about a year?

Yes No  
28%<sub>129</sub>  
15.7s, 22.8%

(12B) Suppose a plastic package is labeled biodegradable, and is claimed to biodegrade in “*some period greater than a year.*” Will it biodegrade in about a year?

Yes No  
19%<sub>149</sub>  
15.1s, 32.6%

(13A) Will a plastic product bearing the logo below biodegrade?



Yes No  
55%<sub>100</sub>  
9.9s, 42%

(13B) Will a plastic product bearing the logo below biodegrade in a landfill? 10.4s, 48.4%



Yes No  
63%<sub>104</sub>  
10.4s, 48.4%

(14)<sup>4</sup>

<b>A</b> <b>(N=257)</b> 14.8s, 35.1%	Package A biodegrades in '9 months to 5 years' (50%) Package B biodegrades in 'some period greater than a year' (40%)  Which package do you think will take longer to biodegrade?
<b>B</b> <b>(N=248)</b> 13.8s, 37.1%	Package A biodegrades in 'some period greater than a year' (60%) Package B biodegrades in '9 months to 5 years' (40%)  Which package do you think will take longer to biodegrade?
<b>C</b> <b>(N=255)</b> 16.2s, 34.2%	Package A biodegrades in '9 months to 5 years' (60%) Package B biodegrades in 'some period greater than a year' (40%)  Which package do you think will biodegrade more quickly?
<b>D</b> <b>(N=259)</b> 17.8s, 37.4%	Package A biodegrades in 'some period greater than a year' (50%) Package B biodegrades in '9 months to 5 years' (50%)  Which package do you think will biodegrade more quickly?

(15A) If a product had biodegraded 20% within the first year, what is your best estimate of the amount of time it would take for it to be 60% biodegraded? **N=147** [0] **23.6s, 20.7%**

< 3 years	3 years	3 < x < 4 years	4 years	4 < x < 5 years	5 years	5 < x ≤ 10 years	10 years	10+ years
13% <sub>19</sub>	60% <sub>88</sub>	0% <sub>0</sub>	6% <sub>9</sub>	0% <sub>0</sub>	2% <sub>3</sub>	5% <sub>8</sub>	1% <sub>1</sub>	13% <sub>19</sub>

(15B) If a product had biodegraded 20% within the first year, what is your best estimate of the amount of time it would take for it to be 90% biodegraded? **N=118** [0] **26.5s, 16.0%**

< 3 years	3 years	3 < x < 4 years	4 years	4 < x < 5 years	5 years	5 < x ≤ 10 years	10 years	10+ years
12% <sub>14</sub>	3% <sub>3</sub>	3% <sub>3</sub>	11% <sub>13</sub>	19% <sub>23</sub>	15% <sub>18</sub>	7% <sub>8</sub>	9% <sub>11</sub>	21% <sub>25</sub>

<sup>4</sup> These data are aggregated. We conducted two or more conditions on three occasions.  
**SHANE FREDERICK, Ph.D.**

APPENDIX B

95% Confidence interval around estimated percentage in category  $\leq 1$  year

(For questions with binary responses, interval around presented statistic.)

1A	50% - 56%
1B	48% - 54%
1C	50% - 56%
1D	38% - 55%
1E	40% - 59%
1F	33% - 51%
1G	71% - 76%
1H	57% - 62%
1I	74% - 78%
1J	23% - 27%
1K	35% - 40%

2A	53% - 70%
2B	59% - 66%
2C	60% - 67%
2D	63% - 78%
2E	63% - 78%

3A	24% - 39%
3B	21% - 35%
3C	36% - 53%
3D	44% - 61%
3E	42% - 58%
3F	37% - 54%
3G	39% - 55%
3H	16% - 29%
3I	15% - 27%
3J	27% - 42%
3K	31% - 46%
<b>no disclaimer</b>	
3L	8% - 21%
3M	9% - 21%
3N	7% - 18%
3O	11% - 23%
3P	9% - 19%

4A	57% - 70%
4B	45% - 61%
4C	52% - 66%
4D	55% - 68%
4E	61% - 74%

5A	25% - 40%
5B	47% - 70%

6	33% - 50%
7	32% - 51%
8A	13% - 26%
8B	29% - 46%
8C	32% - 47%

9A	6% - 18%
9B	34% - 50%
9C	37% - 54%

10A	15% - 29%
10B	33% - 50%

11	71% - 86%
----	-----------

12A	21% - 37%
12B	13% - 26%

13A	45% - 65%
13B	53% - 73%

% believing that unspecific claim implies faster biodegradation

14A	44% - 56%
14B	34% - 46%
14C	34% - 46%
14B	44% - 56%

APPENDIX C

SYNOVATE Study

Q#	Question	Response Options
1	What is your age?	Please enter a number
2	What is your gender?	Please select one: Male 50% Female 50%
3	How would you rate your understanding of the word "biodegradable"? [Please select one]	Please select one 5 – I know it very well and can explain it to some one 33% 4 30% 3 – I know it somewhat and can understand it when people talk about it 32% 2 3% 1 – I don't know what it means 1%
4	In your opinion, what happens to something that biodegrades? [Please select all that apply]	Gets transformed into soil 53% Gets transformed into gases 16% Gets transformed into non-toxic substances 58% Gets transformed into toxic substances 5% None of these 7%
5	If something is labeled "biodegradable", where will it decompose? If you are not sure, please take your best guess. [Select all that apply.]	In the open environment (land or water) as litter 51% In a landfill 72% When buried in your backyard 43% In a home composting device 46% In a commercial composting facility 51% None of these 2%
6	In your opinion, what are the differences between "biodegradation in a landfill" and "biodegradation in a composting environment?" [Please be specific]	Environmental factors (net) 5% Human control factors (net) 14% Level of toxicity/safety (net) 8% Reusability (net) 11% Degradation process (net) 26% Duration of degradation (net) 23% Composition (net) 27% Miscellaneous mentions (net) 10% No difference 1% Don't know/no answer 15%
7	In your opinion, which of the following is best for the environment? [Please select one]	A recyclable product 11% A biodegradable product 12% A product that is both recyclable and biodegradable 77% A product that is neither recyclable or biodegradable 1%
8	How many years do you think it takes for traditional plastic products to biodegrade? <ul style="list-style-type: none"> <li>In the open environment (land or water) as litter</li> <li>In a landfill</li> <li>When buried in your backyard</li> <li>In a home composting device</li> <li>In a commercial composting facility</li> </ul>	<i>In the open environment (land or water) as litter</i> Less than 10 years 16% 10 to 50 years 28% 50 to 100 years 18% 100 to 500 years 4% Greater than 500 years 14% Don't know 20%  <i>In a landfill</i> Less than 10 years 16% 10 to 50 years 31% 50 to 100 years 15% 100 to 500 years 10% Greater than 500 years 9% Don't know 19%





PUBLIC DOCUMENT  
APPENDIX A (to 6-22-2015 Frederick Declaration)

	reduce the burden on landfills?	No 10% Not sure 16%
17	Which of the following best describes the average time it takes for a landfill to reach its full capacity? Please take your best guess if you are not sure. [Please select one]	20 to 40 years 63% 30 to 50 years 28% 40 to 60 years 9%
18	Of the following products which would you prefer? [Please select one]	Plastic products that will biodegrade in a landfill 96% Plastic products that will not biodegrade in a landfill 4%
19	What do you believe is a reasonable amount of time for a "biodegradable" plastic package to decompose in a landfill?	Less than 1 year 25% Less than 5 years 45% Less than 10 years 17% Less than 20 years 6% Less than 40 years 3% 40 years or greater 4%
20	Would it be okay, in your opinion, is it correct for plastic packaging to be labeled "biodegradable" if it is designed to decompose in a landfill in [INSERT RESPONSE FROM Q19]?	Yes 93% No 7%
21	In your opinion what percentage of plastics in the U.S. is composted? [Please select one]	Less than 1% 33% 1- 21% 6-10% 15% 11-19% 8% 20-29% 9% 30-39% 5% 40-49% 3% Greater than 50% 7%
22	Which of the following is true? [Please select all that apply]	I have a composting device or compost pile in my home or yard 19% Curbside composting pick-up is available in my area 14% Curbside recycling pick-up available in my area 62% None of these 27%
23	In your opinion, is it correct for plastic packaging to be labeled "biodegradable" if it is designed to decompose specifically in a commercial composting site and will not really decompose in your backyard? [Please select one]	Yes 37% No 63%
24	As a consumer, what supporting information would you like to see on a package labeled "biodegradable"? Please be as specific as possible.	Where it biodegrades 27% How long it will take to biodegrade 39% Conditions under which it will biodegrade 18% Contact details 1% What should be done with it after use 10% Safety/toxicity issues 5% Environmental benefits 1% Miscellaneous mentions 11% Don't know/no answer 23%
25	How often do you look for Eco-Friendly/Green labels when purchasing a plastic product? [Please select one]	Always 8% Often 30% Occasionally 35% Rarely 17% Never 11%
25a	Each one of the following attributes contributes to lowering a product's burden on the environment. Please rank the following six attributes on what you believe is the most beneficial for the environment with "1" being the most beneficial and "6" being the least beneficial of the response options.	RANKED 1 <sup>st</sup> 2 <sup>nd</sup> 3 <sup>rd</sup> 4 <sup>th</sup> 5 <sup>th</sup> 6 <sup>th</sup>
	Made from recycled materials	14% 17% 23% 21% 14% 9%
	Made with renewable materials	7% 11% 17% 20% 27% 28%
	Biodegradable	28% 24% 16% 15% 11% 7%
	Recyclable	19% 27% 21% 14% 13% 7%
	Made with renewable energy	6% 20% 11% 17% 24% 33%
	Non-toxic	26% 11% 12% 13% 12% 26%

PUBLIC DOCUMENT  
APPENDIX A (to 6-22-2015 Frederick Declaration)

<b>26</b>	Please indicate how much you agree or disagree with the following statement. If the products I currently purchase were made less burdensome on the environment, I would be willing to pay a higher price.	Strongly Agree 10% Somewhat Agree 52% Somewhat Disagree 24% Strongly Disagree 14%																																								
<b>27</b>	How much more would you be willing to pay for products that are less burdensome on the environment?	5% - additional 5 cents per \$1 spent 47% 10% - additional 10 cents per \$1 spent 29% 15% - additional 15 cents per \$1 spent 7% 20% - additional 20 cents per \$1 spent 3% 25% - additional 25 cents per \$1 spent 2% More than 25% 1% Not sure how much 12%																																								
<b>28</b>	You indicated that you would be willing to pay [INSERT SELECTION FROM Q27] for products that are less burdensome on the environment. Please explain why you selected this response.	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th style="text-align: center;">5%</th> <th style="text-align: center;">10%</th> <th style="text-align: center;">15%/+</th> <th style="text-align: center;">NOT SURE</th> </tr> <tr> <th></th> <th colspan="4" style="text-align: center;">ADDT'L</th> </tr> </thead> <tbody> <tr> <td>Seems to be a reasonable amount/what can or can't afford/cost factors</td> <td style="text-align: center;">77%</td> <td style="text-align: center;">74%</td> <td style="text-align: center;">49%</td> <td style="text-align: center;">52%</td> </tr> <tr> <td>Impact on the environment</td> <td style="text-align: center;">20%</td> <td style="text-align: center;">26%</td> <td style="text-align: center;">39%</td> <td style="text-align: center;">12%</td> </tr> <tr> <td>The companies should be responsible too</td> <td style="text-align: center;">4%</td> <td style="text-align: center;">4%</td> <td style="text-align: center;">2%</td> <td style="text-align: center;">6%</td> </tr> <tr> <td>Miscellaneous</td> <td style="text-align: center;">3%</td> <td style="text-align: center;">5%</td> <td style="text-align: center;">7%</td> <td style="text-align: center;">28%</td> </tr> <tr> <td>Don't know/now answer</td> <td style="text-align: center;">5%</td> <td style="text-align: center;">6%</td> <td style="text-align: center;">15%</td> <td style="text-align: center;">15%</td> </tr> <tr> <td>No reason/had to put something down</td> <td style="text-align: center;">3%</td> <td style="text-align: center;">2%</td> <td style="text-align: center;">4%</td> <td style="text-align: center;">2%</td> </tr> </tbody> </table>		5%	10%	15%/+	NOT SURE		ADDT'L				Seems to be a reasonable amount/what can or can't afford/cost factors	77%	74%	49%	52%	Impact on the environment	20%	26%	39%	12%	The companies should be responsible too	4%	4%	2%	6%	Miscellaneous	3%	5%	7%	28%	Don't know/now answer	5%	6%	15%	15%	No reason/had to put something down	3%	2%	4%	2%
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Don't know/now answer	5%	6%	15%	15%																																						
No reason/had to put something down	3%	2%	4%	2%																																						
<b>D1</b>	What is the highest level of education you have completed? [Please select one]	Some high school 2% High school graduate 17% Some college 33% College graduate 34% Post graduate degree 15%																																								
<b>D2</b>	What is your current employment status?	Employed full-time 40% Employed part-time 12% Seeking employment 8% Full-time homemaker 12% Student 4% Retired 24%																																								
<b>D3</b>	[Ask if D2 = "Employed full-time" OR "Employed part-time"] What industry do you work in? [Please select one]	Banking/finance 4% Construction 3% Education 14% Entertainment/hospitality/tourism 2% Food service 2% Government/public service/military 8% Healthcare 11% Manufacturing 6% Professional/business services 12% Retail 7% Skilled trades 3% Social services 2% Transportation 3% Other 22%																																								
<b>D4</b>	Which of the following best describes your racial or ethnic background? [Please select one]	White/Caucasian 85% Black/African-American 5% Hispanic/Spanish/Latino 4% Asian 4% Other 2%																																								

<b>D5</b>	What is your annual household income?	Under \$30,000	25%
		\$30,000 to \$49,999	21%
		\$50,000 to \$74,999	19%
		\$75,000 to \$99,999	14%
		\$100,000 to \$149,999	14%
		\$150,000 to \$199,999	3%
		Over \$200,000	3%

APPENDIX D

APCO study (September 2006)

Q #	Question	Response Options																																																
2	From what you know, if something is labeled 'biodegradable,' does that mean it will decompose in ...	<table> <thead> <tr> <th></th> <th>YES</th> <th>NO</th> <th>UNSURE</th> </tr> </thead> <tbody> <tr> <td>The natural environment</td> <td>86%</td> <td>8%</td> <td>6%</td> </tr> <tr> <td>A landfill</td> <td>83%</td> <td>11%</td> <td>6%</td> </tr> <tr> <td>Your backyard</td> <td>80%</td> <td>15%</td> <td>5%</td> </tr> </tbody> </table>		YES	NO	UNSURE	The natural environment	86%	8%	6%	A landfill	83%	11%	6%	Your backyard	80%	15%	5%																																
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3	As you may know, some manufacturers are starting to make packaging products – things like water bottles, coffee cups, food takeout containers, and shopping bags – that are designed to be biodegradable. Which would be less burdensome in a landfill: traditional packaging products or biodegradable packaging products, or is there no difference? [PROBE: Would that be much less burdensome or somewhat less burdensome in a landfill?]	<table> <thead> <tr> <th></th> <th>Somewhat less</th> <th>Much less</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>Traditional</td> <td>4%</td> <td>4%</td> <td>8%</td> </tr> <tr> <td>Biodegradable</td> <td>22%</td> <td>52%</td> <td>74%</td> </tr> <tr> <td>No difference</td> <td></td> <td></td> <td>13%</td> </tr> <tr> <td>Unsure</td> <td></td> <td></td> <td>5%</td> </tr> </tbody> </table>		Somewhat less	Much less	Total	Traditional	4%	4%	8%	Biodegradable	22%	52%	74%	No difference			13%	Unsure			5%																												
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5	In your view, which is better for the environment: a package that will biodegrade or a package that can be recycled at the end of its useful life, or is there no difference?	<table> <thead> <tr> <th></th> <th>Somewhat better</th> <th>Much better</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>Recycled</td> <td>17%</td> <td>30%</td> <td>47%</td> </tr> <tr> <td>Biodegradable</td> <td>7%</td> <td>20%</td> <td>27%</td> </tr> <tr> <td>No difference</td> <td></td> <td></td> <td>22%</td> </tr> <tr> <td>Unsure</td> <td></td> <td></td> <td>4%</td> </tr> </tbody> </table>		Somewhat better	Much better	Total	Recycled	17%	30%	47%	Biodegradable	7%	20%	27%	No difference			22%	Unsure			4%																												
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<b>8</b>	As you may know, packaging can be made from natural materials, like trees, corn and other plant-based matter, or can be made from synthetic materials, like traditional plastics which are made from petroleum. If a package is made with natural materials, such as the newer corn-based plastics, is it more likely to be biodegradable than a package made from synthetic materials, or not?	<table style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td>Yes</td> <td style="text-align: right;">80%</td> </tr> <tr> <td>No</td> <td style="text-align: right;">10%</td> </tr> <tr> <td>Unsure</td> <td style="text-align: right;">10%</td> </tr> </tbody> </table>	Yes	80%	No	10%	Unsure	10%														
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<b>10</b>	If something were said to be 'biodegradable,' does that mean the same thing, or something different than if something were said to be 'compostable?' [IF SAME THING: Does it mean exactly the same thing to you, does it mean something very similar, or only somewhat similar?]	<table style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td>Exactly the same</td> <td style="text-align: right;">7%</td> </tr> <tr> <td>Very similar</td> <td style="text-align: right;">13%</td> </tr> <tr> <td>Somewhat similar</td> <td style="text-align: right;">20%</td> </tr> <tr> <td>Different</td> <td style="text-align: right;">48%</td> </tr> <tr> <td>Unsure</td> <td style="text-align: right;">12%</td> </tr> </tbody> </table>	Exactly the same	7%	Very similar	13%	Somewhat similar	20%	Different	48%	Unsure	12%										
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<b>11</b>	Do you have a composting device or compost pile in your home or yard?	<table style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td>Yes</td> <td style="text-align: right;">24%</td> </tr> <tr> <td>No</td> <td style="text-align: right;">75%</td> </tr> <tr> <td>Unsure</td> <td style="text-align: right;">1%</td> </tr> </tbody> </table>	Yes	24%	No	75%	Unsure	1%														
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<b>12</b>	Some newer types of packaging are designed to be compostable – that is, the packaging will decompose naturally when placed in a certain environment. If a package, such as a water bottle or deli container, were labeled 'compostable' would that mean to you that it can decompose in a home compost pile or home composting device?"	<table style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td>Yes</td> <td style="text-align: right;">71%</td> </tr> <tr> <td>No</td> <td style="text-align: right;">17%</td> </tr> <tr> <td>Unsure</td> <td style="text-align: right;">12%</td> </tr> </tbody> </table>	Yes	71%	No	17%	Unsure	12%														
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<b>13</b>	Some newer types of packaging are designed to be under professionally managed conditions requiring high heat, moisture and oxygen flow. After the packaging is used, these items must be collected and taken to a large-scale, industrial composting facility in order to fully breakdown as intended. In your view, is it correct for packaging like this to be labeled "biodegradable", or not ?	<table style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td>Yes</td> <td style="text-align: right;">37%</td> </tr> <tr> <td>No</td> <td style="text-align: right;">56%</td> </tr> <tr> <td>Unsure</td> <td style="text-align: right;">7%</td> </tr> </tbody> </table>	Yes	37%	No	56%	Unsure	7%														
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<b>14</b>	If a packaging item is designed to decompose in a	YES NO UNSURE																				

PUBLIC DOCUMENT  
APPENDIX A (to 6-22-2015 Frederick Declaration)

	large-scale, industrial composting facility under professionally-managed conditions and can't readily decompose in the natural environment or in your backyard – would it be okay to label it ...” Biodegradable? Compostable?	Biodegradable 32% 61% 7% Compostable 31% 63% 6%
15	Large-scale composting facilities are a relatively new thing and are not yet available in all areas. If you were at your local grocery store and saw items, such as water bottles or deli containers, that were labeled “compostable,” would you assume that large-scale composting facilities were available in your area?	Yes 43% No 53% Unsure 4%
16	If a packaging label carried the following information: “This package was designed to be composted in a large-scale composting facility. Large-scale composting facilities are not yet available in all areas. Check with your community to see if composting is available in your area,” how likely would you be to check to see if a large-scale composting facility was available in your community?	Very likely 25% Somewhat likely 26% Not very likely 26% Not at all likely 21% Unsure 2%
17	Is curbside recycling available in your area?	Yes 61% No 34% Unsure 5%
18	Thinking about packaging items that are designed for composting, but only after being collected and taken to a large-scale facility, how willing would you be to sort these items, much as you do your recycling, but in a separate container from your recyclables?	Very willing 55% Somewhat willing 31% Not very willing 6% Not at all willing 6% Unsure 1%
19	Imagine you are sorting a mixture of empty plastic water bottles for recycling or composting. Some of the water bottles are made from traditional plastics that are recyclable and some of the water bottles are made from corn-based plastics that can be composted in a large-scale composting facility. In your view, which do you think would cause a bigger problem: Accidentally sending recyclable plastics to a composting facility or accidentally sending compostable plastics to a recycling facility?	Sending recycling to compostable 54% Sending compostable to recycling 21% Both errors would present an equal problem 9% Neither error would present a problem 3% Unsure 13%
20	Do you happen to know whether a large-scale composting facility is available in your area? [IF YES: Is the large-scale composting facility part of a curbside collection program, or are residents required to drop-off discards at a designated location?]	Yes (Curbside) 4% Yes (Drop off) 3% Yes (Not sure which) 3% No 62% Unsure 28%

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Table 1-1  
 Q.S1 - Would you be willing to answer a few questions?

	Gender			Age			
	Total	Male	Female	18-34	35-49	50-65	66+
Base: Total sample	400	199	201	76	92	117	115
	100%	100%	100%	100%	100%	100%	100%
Yes	400	199	201	76	92	117	115
	100%	100%	100%	100%	100%	100%	100%
No	-	-	-	-	-	-	-

Table 2-1  
Q.S2 - Gender

	Gender			Age			
	Total	Male	Female	18-34	35-49	50-65	66+
Base: Total sample	400	199	201	76	92	117	115
	100%	100%	100%	100%	100%	100%	100%
Male	199	199	-	36	47	60	56
	50%	100%		47%	51%	51%	49%
Female	201	-	201	40	45	57	59
	50%		100%	53%	49%	49%	51%

Table 3-1  
Q.S3 - Which of the following categories best describes your age?

	Gender			Age			
	Total	Male	Female	18-34	35-49	50-65	66+
Base: Total sample	400 100%	199 100%	201 100%	76 100%	92 100%	117 100%	115 100%
Under 18	-	-	-	-	-	-	-
18 - 34	76 19%	36 18%	40 20%	76 100%	-	-	-
35 - 49	92 23%	47 24%	45 22%	-	92 100%	-	-
50 - 65	117 29%	60 30%	57 28%	-	-	117 100%	-
66+	115 29%	56 28%	59 29%	-	-	-	115 100%
Mean	52.8	52.9	52.7	26.5	42.5	58.0	73.0
Median	54.3	54.4	54.3	26.5	42.5	58.0	73.0
Std. Dev.	16.8	16.5	17.0	-	-	-	-
Std. Err.	0.8	1.2	1.2	-	-	-	-

Table 4-1  
Q.S4 - Do you or does anyone in your household work for any of the following?

	Gender			Age			
	Total	Male	Female	18-34	35-49	50-65	66+
Base: Total sample	400 100%	199 100%	201 100%	76 100%	92 100%	117 100%	115 100%
An organization that makes or sells automobiles	8 2%	2 1%	6 3%	6 8%	1 1%	1 1%	-
An organization that processes, sells or distributes food products	22 6%	13 7%	9 4%	5 7%	5 5%	11 9%	1 1%
A manufacturer of plastic products	-	-	-	-	-	-	-
A waste disposal organization	-	-	-	-	-	-	-
Some other organization	198 50%	101 51%	97 48%	60 79%	70 76%	52 44%	16 14%
Retired/unemployed/disabled	174 44%	83 42%	91 45%	7 9%	16 17%	53 45%	98 85%

Table 5-1  
 Q.85 - In the past month have you personally purchased any product that came in a plastic container or that was made of plastic?

	Gender			Age			
	Total	Male	Female	18-34	35-49	50-65	66+
Base: Total sample	400	199	201	76	92	117	115
	100%	100%	100%	100%	100%	100%	100%
Yes	400	199	201	76	92	117	115
	100%	100%	100%	100%	100%	100%	100%
No	-	-	-	-	-	-	-

Table 6-1  
Q.S6 - Do you have a general understanding of what the term biodegradable means?

	Gender			Age			
	Total	Male	Female	18-34	35-49	50-65	66+
Base: Total sample	400	199	201	76	92	117	115
	100%	100%	100%	100%	100%	100%	100%
Yes	400	199	201	76	92	117	115
	100%	100%	100%	100%	100%	100%	100%
No	-	-	-	-	-	-	-

Table 7-1  
Q.1 - When you hear the term "biodegradable" what does that mean to you?

	Gender			Age			
	Total	Male	Fe- male	18-34	35-49	50-65	66+
Base: Total sample	400	199	201	76	92	117	115
	100%	100%	100%	100%	100%	100%	100%
Breakdown/Decompose (Net)	326	166	160	61	79	98	88
	82%	83%	80%	80%	86%	84%	77%
-----							
Disintegrates/rots/ breaks down/decomposes over time	89	44	45	16	16	26	31
	22%	22%	22%	21%	17%	22%	27%
Goes back to the earth/ back into the environment	83	43	40	18	21	26	18
	21%	22%	20%	24%	23%	22%	16%
Breaks down/doesn't remain in its original form/degrades	66	30	36	14	13	18	21
	17%	15%	18%	18%	14%	15%	18%
Breaks down naturally	43	29	14	11	18	7	7
	11%	15%	7%	14%	20%	6%	6%
Breaks down with/by soil/in a landfill	38	19	19	3	7	17	11
	10%	10%	9%	4%	8%	15%	10%
Goes back/breaks down to a natural state	11	5	6	1	4	5	1
	3%	3%	3%	1%	4%	4%	1%
Degrades/breaks down faster	9	3	6	3	4	2	-
	2%	2%	3%	4%	4%	2%	
Breaks down/degrades in a reasonable amount of time	5	2	3	1	2	2	-
	1%	1%	1%	1%	2%	2%	
Other breakdown/ decompose comments	17	6	11	2	3	7	5
	4%	3%	5%	3%	3%	6%	4%
Safety (Net)	102	47	55	23	26	28	25
-----	26%	24%	27%	30%	28%	24%	22%
Safely breaks down/will not harm the environment/soil/water/ earth/will not pollute	67	33	34	19	20	15	13
	17%	17%	17%	25%	22%	13%	11%
Not harmful to environment (NS)	35	14	21	4	6	13	12
	9%	7%	10%	5%	7%	11%	10%

Continued

Dave Stewart

Environment Survey #2

May, 2014

Table 7-1  
 Q.1 - When you hear the term "biodegradable" what does that mean to you?

	Gender			Age			
	Total	Male	Fe- male	18-34	35-49	50-65	66+
Miscellaneous (Net)	54	21	33	11	8	15	20
-----	14%	11%	16%	14%	9%	13%	17%
It can be recycled	26	8	18	8	6	5	7
	7%	4%	9%	11%	7%	4%	6%
Can be reused/reusable	12	6	6	2	1	6	3
	3%	3%	3%	3%	1%	5%	3%
Other miscellaneous comments	22	11	11	2	2	6	12
	6%	6%	5%	3%	2%	5%	10%



Table 8-1  
 Q.2 - Is the fact that a product or package is biodegradable important to you?

	Gender			Age			
	Total	Male	Female	18-34	35-49	50-65	66+
Base: Total sample	400	199	201	76	92	117	115
	100%	100%	100%	100%	100%	100%	100%
Yes	301	141	160	49	69	90	93
	75%	71%	80%	64%	75%	77%	81%
No	99	58	41	27	23	27	22
	25%	29%	20%	36%	25%	23%	19%

Table 9-1  
Q.2a - Why is it important (product/package is biodegradable important to you)?

	Gender			Age			
	Total	Male	Fe- male	18-34	35-49	50-65	66+
Base: Those who feel product/package being biodegradable is important	301 100%	141 100%	160 100%	49 100%	69 100%	90 100%	93 100%
Disposal (Net) -----	163 54%	76 54%	87 54%	17 35%	31 45%	54 60%	61 66%
Keeps landfills from filling up/needng more landfills	53 18%	26 18%	27 17%	4 8%	15 22%	12 13%	22 24%
Too much garbage/ reduces the amount of trash/waste	40 13%	16 11%	24 15%	2 4%	9 13%	15 17%	14 15%
Planet/world would be trash filled/don't want to accumulate/no place for the trash to go	36 12%	12 9%	24 15%	5 10%	4 6%	10 11%	17 18%
Don't want trash/ garbage to be around forever	25 8%	10 7%	15 9%	3 6%	5 7%	8 9%	9 10%
Dislike plastic/too much plastic/does not degrade/lasts forever/ harmful to the environment	21 7%	12 9%	9 6%	4 8%	4 6%	8 9%	5 5%
Degrades/takes care of itself/is not permanent	17 6%	10 7%	7 4%	3 6%	1 1%	7 8%	6 6%
Other disposal comments	5 2%	2 1%	3 2%	-	-	3 3%	2 2%
Safety (Net) -----	147 49%	68 48%	79 49%	34 69%	40 58%	37 41%	36 39%
Environmentally friendly/won't hurt/ harm/safer/better for the environment	76 25%	32 23%	44 28%	19 39%	21 30%	19 21%	17 18%

Continued

Dave Stewart

Environment Survey #2

May, 2014

Table 9-1  
Q.2a - Why is it important (product/package is biodegradable important to you)?

	Gender			Age			
	Total	Male	Fe- male	18-34	35-49	50-65	66+
Keeps environment safe for future generations/ future/preservation of the planet/earth	34 11%	20 14%	14 9%	10 20%	11 16%	9 10%	4 4%
Water/oceans should be clean/don't want to pollute the water/ oceans/rivers	16 5%	8 6%	8 5%	2 4%	6 9%	3 3%	5 5%
Reduces/less pollution	12 4%	7 5%	5 3%	3 6%	1 1%	4 4%	4 4%
Not harmful/won't do harm/it's safer (NS)	9 3%	4 3%	5 3%	-	3 4%	3 3%	3 3%
Want to keep the animals safe/do no harm to animals	8 3%	5 4%	3 2%	1 2%	1 1%	2 2%	4 4%
Other safety comments	10 3%	4 3%	6 4%	2 4%	2 3%	1 1%	5 5%
Miscellaneous (Net)	74 25%	33 23%	41 26%	9 18%	17 25%	23 26%	25 27%
Its important to/can be recycled/composted/ reused	56 19%	23 16%	33 21%	8 16%	14 20%	18 20%	16 17%
Other miscellaneous comments	19 6%	10 7%	9 6%	1 2%	3 4%	5 6%	10 11%

Table 10-1  
Q.2b - Why is it not important (product/package is biodegradable important to you)?

	Gender			Age			
	Total	Male	Female	18-34	35-49	50-65	66+
Base: Those who feel product/package being biodegradable is not important	99 100%	58 100%	41 100%	27 100%	23 100%	27 100%	22 100%
I/we recycle/dispose of waste properly/waste can be reused	20 20%	12 21%	8 20%	2 7%	5 22%	5 19%	8 36%
I buy what I want/ concerned only for the items I need	16 16%	9 16%	7 17%	2 7%	8 35%	3 11%	3 14%
Doesn't matter/makes no difference to me/not important to me	13 13%	9 16%	4 10%	2 7%	4 17%	4 15%	3 14%
Never thought about it/ don't think about it	12 12%	8 14%	4 10%	1 4%	3 13%	4 15%	4 18%
Costs more/increases prices/I shop by price/ price conscious	10 10%	6 10%	4 10%	7 26%	1 4%	2 7%	-
Don't pay attention/take the time to look/notice if product is biodegradable	9 9%	3 5%	6 15%	4 15%	2 9%	3 11%	-
I am not into the environment/green movement/not the cause for me	6 6%	3 5%	3 7%	2 7%	1 4%	2 7%	1 5%
Waste goes to the same place/disposed of in a landfill/burned/no need to biodegrade	5 5%	4 7%	1 2%	1 4%	-	4 15%	-
Manufacturers responsibility/they need to make the product biodegradable	4 4%	4 7%	-	2 7%	-	2 7%	-
I don't recycle	4 4%	-	4 10%	1 4%	1 4%	1 4%	1 5%

Continued

Table 10-1  
Q.2b - Why is it not important (product/package is biodegradable important to you)?

	Gender			Age			
	Total	Male	Fe- male	18-34	35-49	50-65	66+
I don't buy that much/ don't create much waste	3 3%	3 5%	-	2 7%	-	-	1 5%
Pointless to worry/I won't be around/I will die but the earth lives on	3 3%	1 2%	2 5%	2 7%	1 4%	-	-
Other comments	12 12%	9 16%	3 7%	3 11%	2 9%	2 7%	5 23%
Don't know/no answer	1 1%	-	1 2%	1 4%	-	-	-

Table 11-1  
 Q.3 - Is the fact that a product is biodegradable helpful to the environment or not?

	Gender			Age			
	Total	Male	Female	18-34	35-49	50-65	66+
Base: Total sample	400	199	201	76	92	117	115
	100%	100%	100%	100%	100%	100%	100%
Yes, helpful	378	186	192	73	87	112	106
	95%	93%	96%	96%	95%	96%	92%
No, not helpful	22	13	9	3	5	5	9
	6%	7%	4%	4%	5%	4%	8%

Table 12-1  
Q.3a - Why is it helpful (product is biodegradable helpful to environment)?

	Gender			Age			
	Total	Male	Fe- male	18-34	35-49	50-65	66+
Base: Those who feel that a product is biodegradable is helpful to the environment	378 100%	186 100%	192 100%	73 100%	87 100%	112 100%	106 100%
Disposal (Net)	247 65%	119 64%	128 67%	53 73%	56 64%	69 62%	69 65%
Keeps landfills from filling up/needng more landfills	62 16%	27 15%	35 18%	15 21%	15 17%	21 19%	11 10%
Natural recycling/earth to earth/dust to dust	51 13%	28 15%	23 12%	7 10%	14 16%	11 10%	19 18%
Reduces the amount of trash/less waste	49 13%	14 8%	35 18%	16 22%	12 14%	10 9%	11 10%
Planet/world would be trash filled/don't want to accumulate trash/waste	32 8%	17 9%	15 8%	5 7%	4 5%	9 8%	14 13%
It breaks down/degrades/decomposes	30 8%	17 9%	13 7%	7 10%	10 11%	8 7%	5 5%
Dissolves/decomposes faster	29 8%	19 10%	10 5%	4 5%	8 9%	10 9%	7 7%
Don't want trash/garbage to be around forever	25 7%	12 6%	13 7%	6 8%	6 7%	5 4%	8 8%
Other disposal comments	5 1%	2 1%	3 2%	-	2 2%	3 3%	-
Safety (Net)	139 37%	69 37%	70 36%	21 29%	32 37%	48 43%	38 36%
Environmentally friendly/won't hurt/harm the environment/nature	65 17%	28 15%	37 19%	9 12%	19 22%	24 21%	13 12%
Reduces/less pollution	27 7%	15 8%	12 6%	7 10%	3 3%	10 9%	7 7%

Continued

Table 12-1  
Q.3a - Why is it helpful (product is biodegradable helpful to environment)?

	Gender			Age			
	Total	Male	Fe- male	18-34	35-49	50-65	66+
Not harmful/won't do harm/contaminate (NS)	23 6%	15 8%	8 4%	3 4%	5 6%	8 7%	7 7%
Less harmful to the ocean/waters/important for cleaner water	18 5%	12 6%	6 3%	3 4%	1 1%	8 7%	6 6%
Less impact on animals/ decomposes safely/will not harm animals	13 3%	8 4%	5 3%	2 3%	3 3%	5 4%	3 3%
Keeps environment safe for future generations/ future of the planet	9 2%	5 3%	4 2%	1 1%	2 2%	4 4%	2 2%
Other safety comments	7 2%	1 1%	6 3%	2 3%	-	2 2%	3 3%
Miscellaneous (Net)	56 15%	31 17%	25 13%	14 19%	14 16%	13 12%	15 14%
Can be reused/made it something else	39 10%	17 9%	22 11%	11 15%	9 10%	8 7%	11 10%
Other miscellaneous comments	19 5%	14 8%	5 3%	5 7%	5 6%	5 4%	4 4%
Don't know/no answer	9 2%	4 2%	5 3%	1 1%	1 1%	3 3%	4 4%



Table 13-1  
Q.3c - How is being biodegradable helpful to the environment?

	Gender			Age			
	Total	Male	Fe- male	18-34	35-49	50-65	66+
Base: Those who feel that a product is biodegradable is helpful to the environment	378 100%	186 100%	192 100%	73 100%	87 100%	112 100%	106 100%
Disposal (Net)	228 60%	107 58%	121 63%	45 62%	58 67%	63 56%	62 58%
Keeps landfills from filling up/needng more landfills	58 15%	30 16%	28 15%	12 16%	16 18%	13 12%	17 16%
Reduces the amount of trash/less waste	48 13%	19 10%	29 15%	14 19%	16 18%	10 9%	8 8%
It breaks down/degrades/decomposes	48 13%	21 11%	27 14%	5 7%	12 14%	17 15%	14 13%
Natural recycling/earth to earth/dust to dust	42 11%	22 12%	20 10%	8 11%	5 6%	10 9%	19 18%
Don't want trash/garbage to be around forever	24 6%	11 6%	13 7%	4 5%	6 7%	8 7%	6 6%
Planet/world would be trash filled/don't want to accumulate trash/waste	24 6%	14 8%	10 5%	5 7%	5 6%	6 5%	8 8%
Dissolves/decomposes faster	21 6%	10 5%	11 6%	6 8%	8 9%	3 3%	4 4%
Other disposal comments	7 2%	2 1%	5 3%	1 1%	1 1%	4 4%	1 1%
Safety (Net)	141 37%	71 38%	70 36%	31 42%	31 36%	41 37%	38 36%
Reduces/less pollution	49 13%	25 13%	24 13%	13 18%	13 15%	12 11%	11 10%
Environmentally friendly/won't hurt/harm the environment (NS)	44 12%	24 13%	20 10%	10 14%	8 9%	15 13%	11 10%

Continued

Table 13-1  
Q.3c - How is being biodegradable helpful to the environment?

	Gender			Age			
	Total	Male	Fe- male	18-34	35-49	50-65	66+
Not harmful to plants and animals/sea life	21 6%	11 6%	10 5%	5 7%	3 3%	7 6%	6 6%
Helps water quality/ oceans/ivers are cleaner	17 4%	9 5%	8 4%	8 11%	3 3%	4 4%	2 2%
Not harmful/won't do harm/contaminate (NS)	16 4%	7 4%	9 5%	4 5%	1 1%	5 4%	6 6%
Cleaner air/not harmful to the air we breathe	11 3%	5 3%	6 3%	2 3%	1 1%	5 4%	3 3%
Does not clog systems/ processes	9 2%	5 3%	4 2%	1 1%	3 3%	4 4%	1 1%
Gases/no harmful gases/ doesn't put off gases	6 2%	1 1%	5 3%	-	2 2%	-	4 4%
Keeps environment safe for future generations/ future of the planet	4 1%	3 2%	1 1%	-	2 2%	1 1%	1 1%
Other safety comments	6 2%	2 1%	4 2%	2 3%	-	2 2%	2 2%
Miscellaneous (Net)	78 21%	39 21%	39 20%	16 22%	14 16%	23 21%	25 24%
Can be reused/made into something else	33 9%	15 8%	18 9%	7 10%	4 5%	12 11%	10 9%
Recycled/able to recycle	16 4%	8 4%	8 4%	6 8%	2 2%	3 3%	5 5%
Feeds the soil/gives back/renews the soil/ environment	11 3%	6 3%	5 3%	4 5%	3 3%	3 3%	1 1%
Use fewer resources/ natural resources are not used up	9 2%	4 2%	5 3%	1 1%	1 1%	2 2%	5 5%
Other miscellaneous comments	19 5%	10 5%	9 5%	2 3%	5 6%	6 5%	6 6%
Don't know/no answer	17 4%	9 5%	8 4%	3 4%	3 3%	4 4%	7 7%

Table 14-1  
Q.4 - If something is biodegradable, how long do you think it would take for it to decompose or decay?

	Gender			Age			
	Total	Male	Fe- male	18-34	35-49	50-65	66+
Base: Total sample	400 100%	199 100%	201 100%	76 100%	92 100%	117 100%	115 100%
Varies on the type of product/depends on the material/what it is	154 39%	88 44%	66 33%	23 30%	40 43%	45 38%	46 40%
One to less than 5 years	25 6%	12 6%	13 6%	5 7%	9 10%	3 3%	8 7%
Paper/paper products degrade fast/faster	23 6%	14 7%	9 4%	2 3%	7 8%	9 8%	5 4%
Plastic does not degrade/plastic lasts forever/takes years to decay	23 6%	14 7%	9 4%	4 5%	5 5%	8 7%	6 5%
Forever/takes a long time/100 years	22 6%	10 5%	12 6%	2 3%	7 8%	7 6%	6 5%
Depends on the conditions/climate/environment/how product is disposed of	21 5%	11 6%	10 5%	2 3%	3 3%	7 6%	9 8%
One year	18 5%	9 5%	9 4%	8 11%	4 4%	3 3%	3 3%
Less than 6 months	17 4%	4 2%	13 6%	6 8%	5 5%	6 5%	-
Two years	16 4%	8 4%	8 4%	2 3%	7 8%	5 4%	2 2%
5 to 10 years	16 4%	8 4%	8 4%	5 7%	5 5%	5 4%	1 1%
More than 10 years	15 4%	6 3%	9 4%	5 7%	4 4%	4 3%	2 2%
6 months to one year	13 3%	9 5%	4 2%	3 4%	2 2%	4 3%	4 3%
Vegetation is fast/breaks down quicker	12 3%	5 3%	7 3%	2 3%	4 4%	4 3%	2 2%
Depends on the size of the item/product	12 3%	4 2%	8 4%	3 4%	4 4%	2 2%	3 3%

Continued

Dave Stewart

Environment Survey #2

May, 2014

Table 14-1

Q.4 - If something is biodegradable, how long do you think it would take for it to decompose or decay?

	Gender			Age			
	Total	Male	Female	18-34	35-49	50-65	66+
1-2 weeks	11 3%	5 3%	6 3%	6 8%	-	1 1%	4 3%
5 years	11 3%	5 3%	6 3%	1 1%	2 2%	6 5%	2 2%
10 years	11 3%	5 3%	6 3%	1 1%	4 4%	3 3%	3 3%
One month	5 1%	1 1%	4 2%	2 3%	-	2 2%	1 1%
3-4 weeks	3 1%	2 1%	1 *	2 3%	-	1 1%	-
Other comments	31 8%	16 8%	15 7%	7 9%	8 9%	8 7%	8 7%
Don't know/no answer	47 12%	18 9%	29 14%	5 7%	5 5%	13 11%	24 21%

Table 15-1

Q.4a - Do you think there are differences in the amount of time it takes for different types of products to biodegrade, decompose or decay?

	Gender			Age			
	Total	Male	Female	18-34	35-49	50-65	66+
Base: Total sample	400 100%	199 100%	201 100%	76 100%	92 100%	117 100%	115 100%
Yes	392 98%	195 98%	197 98%	76 100%	90 98%	115 98%	111 97%
No	8 2%	4 2%	4 2%	-	2 2%	2 2%	4 3%

Table 16-1  
Q.4b - What differences exist in the time for different types of products to biodegrade, decompose or decay?

	Gender			Age			
	Total	Male	Fe- male	18-34	35-49	50-65	66+
Base: Those who believe differences exist in time for different types of products to biodegrade, decompose or decay	392 100%	195 100%	197 100%	76 100%	90 100%	115 100%	111 100%
Timing varies	116 30%	64 33%	52 26%	22 29%	31 34%	36 31%	27 24%
Composition/what it's made of/what the product is	109 28%	59 30%	50 25%	25 33%	32 36%	28 24%	24 22%
The environment/where its located/surrounding	43 11%	30 15%	13 7%	7 9%	12 13%	12 10%	12 11%
If contains plastic will take longer/how much plastic is in the product	41 10%	22 11%	19 10%	9 12%	11 12%	14 12%	7 6%
Paper/paper products degrade fast/faster	31 8%	18 9%	13 7%	6 8%	10 11%	11 10%	4 4%
Density of the product/material	27 7%	16 8%	11 6%	5 7%	6 7%	8 7%	8 7%
Weather conditions/climate/temperature	25 6%	15 8%	10 5%	4 5%	7 8%	6 5%	8 7%
Size of the product	20 5%	13 7%	7 4%	9 12%	6 7%	1 1%	4 4%
Plant/vegetation degrade fast/faster	19 5%	7 4%	12 6%	3 4%	6 7%	5 4%	5 5%
Is the product made by nature or man	18 5%	8 4%	10 5%	8 11%	4 4%	3 3%	3 3%
Chemicals/what chemicals are in the product	17 4%	7 4%	10 5%	4 5%	4 4%	6 5%	3 3%
Metal/metal products take years/a long time to degrade	5 1%	1 1%	4 2%	-	1 1%	3 3%	1 1%
Other comments	24 6%	12 6%	12 6%	2 3%	8 9%	8 7%	6 5%

Continued

Table 16-1

Q.4b - What differences exist in the time for different types of products to biodegrade, decompose or decay?

	Gender		Age				
	Male	Female	18-34	35-49	50-65	66+	
Don't know/no answer	72 18%	24 12%	48 24%	9 12%	9 10%	24 21%	30 27%

Table 17-1  
Q.5a - What does transform any plastic into biodegradable plastic mean to you?

	Gender			Age			
	Total	Male	Fe- male	18-34	35-49	50-65	66+
Base: Total sample	400 100%	199 100%	201 100%	76 100%	92 100%	117 100%	115 100%
Additive/chemical added to make plastic break down/biodegradable	109 27%	50 25%	59 29%	27 36%	28 30%	32 27%	22 19%
New procedure/technology to break things down when otherwise it would not	56 14%	25 13%	31 15%	12 16%	14 15%	16 14%	14 12%
Unbelievable/not true/doubt statement	51 13%	25 13%	26 13%	6 8%	12 13%	16 14%	17 15%
Too hard to understand/confusing/doesn't make sense/need better explanation	34 9%	16 8%	18 9%	3 4%	5 5%	10 9%	16 14%
Good idea/good news	30 8%	18 9%	12 6%	8 11%	6 7%	10 9%	6 5%
Faster breakdown/ability to breakdown/decompose faster with additive	29 7%	17 9%	12 6%	5 7%	5 5%	12 10%	7 6%
Can change/transform plastic to be biodegradable and maintain integrity/characteristics	22 6%	9 5%	13 6%	7 9%	9 10%	6 5%	-
Need more information/details	16 4%	6 3%	10 5%	2 3%	6 7%	3 3%	5 4%
Would be better/safer for the environment	16 4%	10 5%	6 3%	3 4%	5 5%	7 6%	1 1%
Concerns about safety of additive/chemical/is it harmful to the environment/people/food	15 4%	7 4%	8 4%	2 3%	6 7%	4 3%	3 3%
Can be reusable/its reusable/make new plastic products	13 3%	8 4%	5 2%	2 3%	2 2%	4 3%	5 4%

Continued



Table 17-1  
Q.5a - What does transform any plastic into biodegradable plastic mean to you?

	Gender			Age			
	Total	Male	Fe- male	18-34	35-49	50-65	66+
Question was too long/too wordy/lost track of what question asked/was about	8 2%	4 2%	4 2%	1 1%	3 3%	1 1%	3 3%
Other comments	44 11%	27 14%	17 8%	8 11%	11 12%	11 9%	14 12%
Nothing/means nothing	7 2%	3 2%	4 2%	1 1%	-	3 3%	3 3%
Don't know/no answer	38 10%	15 8%	23 11%	3 4%	6 7%	9 8%	20 17%

Table 18-1  
Q.5b - What does the claim "Plastic products manufactured with our additives will biodegrade" mean to you?

	Gender			Age			
	Total	Male	Fe- male	18-34	35-49	50-65	66+
Base: Total sample	400	199	201	76	92	117	115
	100%	100%	100%	100%	100%	100%	100%
Gone/decomposed/ biodegrade in one year	95	42	53	19	22	29	25
	24%	21%	26%	25%	24%	25%	22%
Some products will take longer/longer to biodegrade/longer than a year	55	27	28	9	9	17	20
	14%	14%	14%	12%	10%	15%	17%
If you add something it becomes biodegradable	50	19	31	16	16	10	8
	13%	10%	15%	21%	17%	9%	7%
Plastic becomes biodegradable	44	20	24	5	11	16	12
	11%	10%	12%	7%	12%	14%	10%
Needs specific environment to break down/type of landfill	41	18	23	11	6	16	8
	10%	9%	11%	14%	7%	14%	7%
Unbelievable/doubt the claim/not true	35	21	14	6	7	12	10
	9%	11%	7%	8%	8%	10%	9%
How many more years beyond one/how much time exactly	35	15	20	2	10	9	14
	9%	8%	10%	3%	11%	8%	12%
Great/wonderful/would like that	31	18	13	6	6	11	8
	8%	9%	6%	8%	7%	9%	7%
Additive will make it break down faster/plastic break down faster	31	16	15	12	4	8	7
	8%	8%	7%	16%	4%	7%	6%
Landfills will benefit/ less plastic in landfills	24	15	9	6	5	5	8
	6%	8%	4%	8%	5%	4%	7%
Need more information/ specifics/details	15	10	5	2	1	2	10
	4%	5%	2%	3%	1%	2%	9%
Concerns/questions about safety of the additive	14	6	8	-	5	5	4
	4%	3%	4%		5%	4%	3%
Better/good for the environment	9	7	2	-	-	6	3
	2%	4%	1%			5%	3%

Continued

Dave Stewart

Environment Survey #2

May, 2014

Table 18-1

Q.5b - What does the claim "Plastic products manufactured with our additives will biodegrade" mean to you?

	Gender			Age			
	Total	Male	Fe- male	18-34	35-49	50-65	66+
Proof/need proof of claim	8 2%	5 3%	3 1%	-	2 2%	2 2%	4 3%
Confusing/I don't understand/doesn't make sense	6 2%	3 2%	3 1%	-	1 1%	2 2%	3 3%
Other comments	32 8%	18 9%	14 7%	6 8%	11 12%	8 7%	7 6%
Nothing/means nothing	5 1%	1 1%	4 2%	-	-	2 2%	3 3%
Don't know/no answer	9 2%	3 2%	6 3%	3 4%	3 3%	1 1%	2 2%

Table 19-1  
Q.5c - What does claim "Plastic products made with ECM additives: Fully biodegrade" mean to you?

	Gender			Age			
	Total	Male	Fe- male	18-34	35-49	50-65	66+
Base: Total sample	400	199	201	76	92	117	115
	100%	100%	100%	100%	100%	100%	100%
Timing (Net)	166	75	91	36	40	53	37
-----	42%	38%	45%	47%	43%	45%	32%
Will biodegrade in 9 months to 5 years	56	30	26	14	14	21	7
	14%	15%	13%	18%	15%	18%	6%
Biodegrade/be gone within/less than 5 years	45	20	25	5	11	15	14
	11%	10%	12%	7%	12%	13%	12%
Will degrade/breakdown faster	33	15	18	13	5	11	4
	8%	8%	9%	17%	5%	9%	3%
Timing varies/items degrade at different times	12	5	7	2	2	4	4
	3%	3%	3%	3%	2%	3%	3%
Could biodegrade in 9 months	10	1	9	3	3	-	4
	3%	1%	4%	4%	3%		3%
5 years is too long/ still too long to biodegrade	9	5	4	1	2	1	5
	2%	3%	2%	1%	2%	1%	4%
Other timing comments	16	8	8	3	3	6	4
	4%	4%	4%	4%	3%	5%	3%
Miscellaneous (Net)	305	156	149	62	75	89	79
-----	76%	78%	74%	82%	82%	76%	69%
If it has the chemical/additive it will biodegrade	87	35	52	22	22	29	14
	22%	18%	26%	29%	24%	25%	12%
Will biodegrade with or without oxygen/in land or the air/different environments	57	30	27	12	19	17	9
	14%	15%	13%	16%	21%	15%	8%
Don't understand/don't know what the words mean/aerobically/anaerobically	45	18	27	5	10	11	19
	11%	9%	13%	7%	11%	9%	17%

Continued

Table 19-1  
Q.5c - What does claim "Plastic products made with ECM additives: Fully biodegrade" mean to you?

	Gender			Age			
	Total	Male	Fe- male	18-34	35-49	50-65	66+
Will breakdown/degrade in a landfill/in soil/ special landfill	31 8%	16 8%	15 7%	4 5%	11 12%	11 9%	5 4%
Great/wonderful/sounds good	30 8%	18 9%	12 6%	6 8%	2 2%	11 9%	11 10%
Requires a specific environment to degrade/ special circumstances	26 7%	12 6%	14 7%	11 14%	11 12%	4 3%	-
What is ECM/don't know what ECM additive is	24 6%	17 9%	7 3%	3 4%	2 2%	6 5%	13 11%
Don't believe claim/not true	16 4%	9 5%	7 3%	3 4%	2 2%	3 3%	8 7%
Safety concerns/is it toxic/harmful to the environment/people/ animals	14 4%	10 5%	4 2%	2 3%	2 2%	6 5%	4 3%
Need proof/need proof of claim	7 2%	3 2%	4 2%	1 1%	2 2%	3 3%	1 1%
Other miscellaneous comments	43 11%	24 12%	19 9%	8 11%	11 12%	13 11%	11 10%
Nothing/means nothing	4 1%	1 1%	3 1%	2 3%	-	-	2 2%
Don't know/no answer	27 7%	11 6%	16 8%	3 4%	5 5%	7 6%	12 10%

# PLASTIC CONTAINER GCS (30) vs. GCS (3J)

Question Type	Wording	1 Year or Less	5
Control (no logo)	<b>GCS (30)</b> What is your best estimate for the amount of time it would take for this container to biodegrade?	16%	21%
Biodegradable logo	<b>GCS (3J)</b> What is your best estimate of the amount of time it would take for this container (which bears the symbol “ECM biodegradable”) to biodegrade?	34%	56%
<b>Difference between conditions</b>		18%	35%



30



3J

# PLASTIC BAG GCS (3P) vs. GCS (3K)

Question Type	Wording	1 Year or Less	5
Control (no logo)	<b>GCS (3P)</b> What is your best estimate of the amount of time it would take for this plastic bag to biodegrade?	13%	25%
Biodegradable logo	<b>GCS (3K)</b> What is your best estimate of the amount of time it would take for this plastic bag (which bears the symbol “ECM biodegradable”) to biodegrade?	38%	57%
<b>Difference between conditions</b>		25%	32%



3P



3K

# PLASTIC CONTAINER GCS (8A) vs. GCS (8B)

Question Type	Wording	
Control (no logo)	<b>GCS (8A)</b> Will this container break down completely into elements found in nature?	18%
Biodegradable logo	<b>GCS (8B)</b> Will this container break down completely into elements found in nature?	37%
Difference between conditions		19%



8A



8B



# PLASTIC CONTAINER GCS (8A) vs. GCS (8C)

Question Type	Wording	
Control (no logo)	<b>GCS (8A)</b> Will this container break down completely into elements found in nature?	18%
Biodegradable logo	<b>GCS (8C)</b> Will this container (which bears the symbol “ECM biodegradable”) break down completely into elements found in nature?	39%
Difference between conditions		21%



8A



8C

# PLASTIC BAG GCS (9A) vs. GCS (9B)

Question Type	Wording	
Control (no logo)	<b>GCS (9A)</b> Will this plastic bag break down completely into elements found in nature?	11%
Biodegradable logo	<b>GCS (9B)</b> Will this plastic bag break down completely into elements found in nature?	42%
<b>Difference between conditions</b>		31%



9A



9B

# PLASTIC BAG GCS (9A) vs. GCS (9C)

Question Type	Wording	
Control (no logo)	<b>GCS (9A)</b> Will this plastic bag break down completely into elements found in nature?	11%
Biodegradable logo	<b>GCS (9C)</b> Will this plastic bag (which bears the symbol “ECM biodegradable”) break down completely into elements found in nature?	45%
Difference between conditions		34%



9A



9C

## PLASTIC PACKAGE GCS (3L) AND 3(M) VS. GCS (3A)

Question Type	Wording	1 Year or Less	5
Control (no claim)	<b>GCS (3L)</b> If a plastic package is NOT labeled “biodegradable,” how long will it take to decompose?	13%	17%
Control (no claim)	<b>GCS (3M)</b> How long does it take a plastic package to decompose?	14%	22%
Biodegradable claim made	<b>GCS (3A)</b> Suppose a plastic package is labeled biodegradable. How long do you think it will take to biodegrade?	31%	56%
Difference between conditions (3A) – (3L)		18%	39%
Difference between conditions (3A) – (3M)		17%	34%

## PLASTIC PACKAGE GCS (3L) AND 3(M) VS. GCS (3B)

Question Type	Wording	1 Year or Less	5
Control (no claim)	<b>GCS (3L)</b> If a plastic package is NOT labeled “biodegradable,” how long will it take to decompose?	13%	17%
Control (no claim)	<b>GCS (3M)</b> How long does it take a plastic package to decompose?	14%	22%
Biodegradable claim made	<b>GCS (3B)</b> Suppose a plastic product is labeled biodegradable. How much time do you think it would take to biodegrade?	28%	47%
<b>Difference between conditions (3B) – (3L)</b>		15%	30%
<b>Difference between conditions (3B) – (3M)</b>		14%	25%

## PLASTIC PACKAGE GCS (3L) AND 3(M) VS. GCS (3C)

Question Type	Wording	1 Year or Less	5
Control (no claim)	<b>GCS (3L)</b> If a plastic package is NOT labeled “biodegradable,” how long will it take to decompose?	13%	17%
Control (no claim)	<b>GCS (3M)</b> How long does it take a plastic package to decompose?	14%	22%
Biodegradable claim made	<b>GCS (3C)</b> If a plastic package is labeled “biodegradable,” how long will it take to decompose?	44%	64%
<b>Difference between conditions (3C) – (3L)</b>		31%	47%
<b>Difference between conditions (3C) – (3M)</b>		30%	42%

# WATER BOTTLE GCS (3N) vs. GCS (3D)

Question Type	Wording	1 Year or Less	5
Control (no claim)	<b>GCS (3N)</b> How long would it take a plastic water bottle to decompose?	11%	18%
Biodegradable claim made	<b>GCS (3D)</b> If you saw this label on a plastic water bottle, how long would it take to decompose?	52%	70%
Difference between conditions		41%	52%



3D

# WATER BOTTLE GCS (3N) vs. GCS (3E)

Question Type	Wording	1 Year or Less	5
Control (no claim)	<b>GCS (3N)</b> How long would it take a plastic water bottle to decompose?	11%	18%
Biodegradable claim made	<b>GCS (3E)</b> If you saw this label on a plastic water bottle, how long would it take to decompose?	50%	68%
Difference between conditions		39%	50%



3E



# WATER BOTTLE GCS (3N) vs. GCS (3F)

Question Type	Wording	1 Year or Less	5
Control (no claim)	<b>GCS (3N)</b> How long would it take a plastic water bottle to decompose?	11%	18%
Biodegradable claim made	<b>GCS (3F)</b> If you saw this label on a plastic water bottle, how long would it take to decompose?	45%	68%
Difference between conditions		34%	50%



3F

## WATER BOTTLE GCS (3N) vs. GCS (3G)

Question Type	Wording	1 Year or Less	5
Control (no claim)	<b>GCS (3N)</b> How long would it take a plastic water bottle to decompose?	11%	18%
Biodegradable claim made	<b>GCS (3G)</b> If you saw this label on a plastic water bottle, how long would it take to decompose?	47%	71%
Difference between conditions		36%	53%



3G

# WATER BOTTLE GCS (3N) vs. GCS (3G')

Question Type	Wording	1 Year or Less	5
Control (no claim)	<b>GCS (3N)</b> How long would it take a plastic water bottle to decompose?	11%	18%
Biodegradable claim made	<b>GCS (3G')</b> If you saw this label on a plastic water bottle, how long do you think it would take to decompose?	52%	76%
Difference between conditions		41%	58%



3G'