4. Structure and Content of the Final Survey Instrument

This chapter presents the section-by-section wording of the final Coral Reef Valuation Study survey instrument.

The survey instrument has seven sections. The first section (Screens 1 through 5) briefly introduces the topic of the survey, tests whether respondents have audio capabilities on their computers, and provides a warm-up question. The second section (Screens 6 and 7) familiarizes respondents with the survey format, content, and purpose. The third section (Screens 8 through 18) describes baseline conditions of Hawaiian coral reefs (i.e., conditions before overfishing and ship strikes). The fourth section (Screens 19 through 30) describes one of the threats to coral reefs on the MHI: overfishing. It also describes a plan to alleviate the pressure from overfishing by increasing the size of no-fishing zones. The fifth section (Screens 31 through 38) explains the impacts of another threat to coral reefs: ship strikes. It also presents a plan to repair coral reefs damaged by ship strikes. The sixth section (Screens 39 through 48) shows respondents the Current Program and several alternative programs and asks them to choose their most preferred programs. The seventh section (Screens 49 through 68) asks a series of debriefing questions. Actual screen shots of the administered survey are provided in Appendix A.

4.1 Section 1. Instructions and Warm-up

Screen 1 begins the survey by letting respondents know that the survey will include questions about coral reefs and that they will have an opportunity to provide comments at the end of the survey. It also thanks people in advance for their participation.

> This survey will include questions about coral reefs. If you like, you can give us your comments about any or all of today's questions at the end of this survey.
>
> Thank you for your help!

The next three screens deal with audio. Screen 2 informs respondents about the upcoming audio clip on Screen 3, tells them that the upcoming audio clip is not related the content of the survey, and reminds respondents to turn on their audio speakers.

> On the following screen, you will hear a short music file. The music is not related to the subject matter of this survey. It is only used to find out whether your Internet device allows you to hear audio files.
>
> Before you proceed, please make sure that the speakers of your Internet device are turned on.

Screen 3 tests whether panel members have audio capability to determine which version of the survey they will receive. Respondents hear a short, 18-second clip of music.

> Please listen to the entire music file before pressing the "Next" button to continue your survey.
>
> Screen 4 asks respondents whether they heard the audio clip. Did you hear the music file?[1]

If respondents answer "yes" to this question, they are directed to Screen 4a. This screen informs them that some instructions are also given by audio and that they should turn up their audio. Respondents are also reminded to read the screen carefully, even if audio is provided.

> Later in the survey, some instructions are given with additional audio explanations. Please have your audio on to receive instructions. Please read each screen carefully, even if audio is provided.

Those who answered "no" or "not sure," who did not have speakers, or who could not hear the audio clip did not have any audio throughout the rest of the survey. (In fact, the audio was used only as a supplement for the choice question descriptions on screens 41 and 42.)

Screen 5 presents respondents with questions from the nationally representative GSS,[2] which are placed at the beginning of the survey to serve both as a warm-up and to provide information to help evaluate potential attitudinal differences between the respondents to our survey and respondents to the GSS. We presented the GSS questions in the survey in the same manner as they are presented in the GSS (see question wording below). These warm-up questions ask respondents whether they think that we spend too much, too little, or about the right amount on space exploration, the environment, health, assistance to big cities, law enforcement, drug rehabilitation, and education. Half of the respondents see the problem category descriptions just

1. Respondents could answer "yes," "no," or "not sure" for this question.

2. See Chapter 6 for a discussion of the GSS.

described.[3] The other half were asked the same question but saw different problem category descriptions: spending on the space exploration program, improving and protecting the environment, improving and protecting the nation's health, solving the problems of big cities, halting the rising crime rate, dealing with drug addiction, and improving the nation's education system.

> We are faced with many problems in this country, none of which can be solved easily or inexpensively. Below are some of these problems. For each one, please indicate if you think we are spending too much money on it, about the right amount, or too little money on it.

4.2 Section 2. Introduction

Section 2 introduces the topic of the survey: management options for coral reefs in Hawaii. Screen 6 tells respondents that the survey will give them information about a program and that the government wants to hear their opinions about whether to start this new program, which would require taxpayer money.

> MANAGEMENT OPTIONS FOR CORAL REEFS IN HAWAII –
> WHAT IS YOUR OPINION?
>
> Sometimes the Government considers starting a new program. The Government does not want to start a new program unless people are willing to pay for it. One way for the Government to find out about this is to give people like you information about a program in a survey like this, so you can make up your own mind about it.

To ensure respondents did not think the survey designers were endorsing any particular views, respondents were told that different people have different views about the program.

> Some people think the program they are asked about is not needed; others think it is. We want to get the opinions of all kinds of people.

Respondents then learned about the particular program addressed in this survey. This part of Screen 6 also tells them that their opinions are important and that the survey will provide them with some information to answer questions.

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3. The versions were randomized across surveys. The category descriptions are described in the GSS as the "standard" and "variant" wording version of the spending questions.

The particular program addressed in this survey involves coral reefs in Hawaii. The federal government is considering options to increase the protection of coral reefs around Hawaii, but it is not sure if it should do more, because this will require more government spending paid for by taxpayers.

Even though you may not be familiar with this issue, as a taxpayer your opinions matter. We will provide you with information to help you answer the questions. Through this survey, government officials will consider your opinions, along with information from scientists and planners, when deciding what more, if anything, to do.

At the bottom of Screen 6, panel respondents are informed that their participation is voluntary and respondents are provided an opportunity to obtain more information.

Your participation is voluntary.

If you would like more information about your rights as a survey participant, please click here. S

Screen 6 explicitly identifies NOAA as a U.S. government agency funding the survey. The NOAA logo is prominently displayed on the initial screen of the survey as is the OMB control number and expiration date.

This survey is funded by the National Oceanic and Atmospheric Administration, which is a U.S. government agency charged with making decisions about coral reef management for the United States.

OMB NO.: 0648-0585 Coral Reef Economic Valuation Final Survey Approval Expiration 03/31/2012

Respondents who checked the box near the bottom of Screen 6 were directed to Screen 6a. Screen 6a provides information about the policies regarding survey participation and efforts to protect respondents' privacy. Respondents are also provided an 800-telephone number to call if they have any questions.

You may skip any questions that you do not wish to answer. You will not be disqualified from participation in other surveys. As always, your identity will not be reported or linked to any data resulting from the study. All of the terms and conditions described in the Privacy and Term of Use Policy that you received with your Internet access equipment are in effect. If you have questions about this survey, you may contact Panel Relations at (800) 782-6899.

Screen 7 informs respondents that this survey will present information about coral reefs, including pictures and maps. Respondents also learn that they can move forward or backward in the survey through links provided on the lower left corner of each screen and return to wherever they were in the survey before linking to any information.

> In this survey, you will be presented information about coral reefs, including pictures and maps.
>
> For upcoming screens, if you want to review information that you saw earlier, you can go back by clicking the "Previous Information" button on the screen. When you are done reviewing the information, you can return to where you were in the survey.

4.3 Section 3. Description of Baseline Conditions

Section 3 presents information about coral reefs and coral reef ecosystems using text and an illustration. The text in Screen 8 describes what a coral reef ecosystem is and where coral reefs are found, highlighting the types of marine animals found on and near coral reefs. These pictures were intended to build some interest in the survey and to remind people about what they may have seen on television or in magazines about coral reefs.

> Below is a picture of a coral reef ecosystem from Hawaii, including various types of coral and fish.

> Coral reefs are found throughout the world in ocean waters less than 300 feet deep.
>
> · Coral reefs are made of connected skeletons of millions of small animals called corals.
>
> · Coral reef ecosystems include the coral reefs, neighboring areas of sea bottom, ocean waters, and many kinds of fish, plants, and animals nearby.

- Coral reef ecosystems provide a place to live for many ocean species including fish, sea turtles, seals, dolphins, shrimp, octopuses, sea snails, sea plants, and sea birds.

- Most coral reef ecosystems are in water less than 60 feet deep.

This information is followed by a question on Screen 9 asking how often a respondent has read or heard about coral reefs. The responses to this question can be used to differentiate survey respondents' level of previous familiarity with coral reefs.

> How often have you read or heard about coral reefs, either in U.S. waters or elsewhere?[4]

Screen 10 then asks how many times respondents have been to a coral reef in the United States or elsewhere.

> About how many times have you been to a coral reef in the U.S. or elsewhere to fish, snorkel, scuba dive, view marine life, or for some other reason?

If a respondent has been to a reef before, he/she is asked on Screen 10a where this visit occurred.

> Where have you visited a coral reef?[5]

On Screen 11, respondents learn that 10% of coral reefs in the United States are found around the Hawaiian Islands; most other coral reefs are found around Florida. They also learn that the Hawaiian Islands are commonly divided into two groups: the MHI and the NWHI.

> About 10% of coral reef ecosystems in the U.S. are around the Hawaiian Islands; most of the rest are around Florida.[6]
>
> The Hawaiian Islands are commonly grouped into the Main Hawaiian Islands and the Northwestern Hawaiian Islands, as shown on the next screen.

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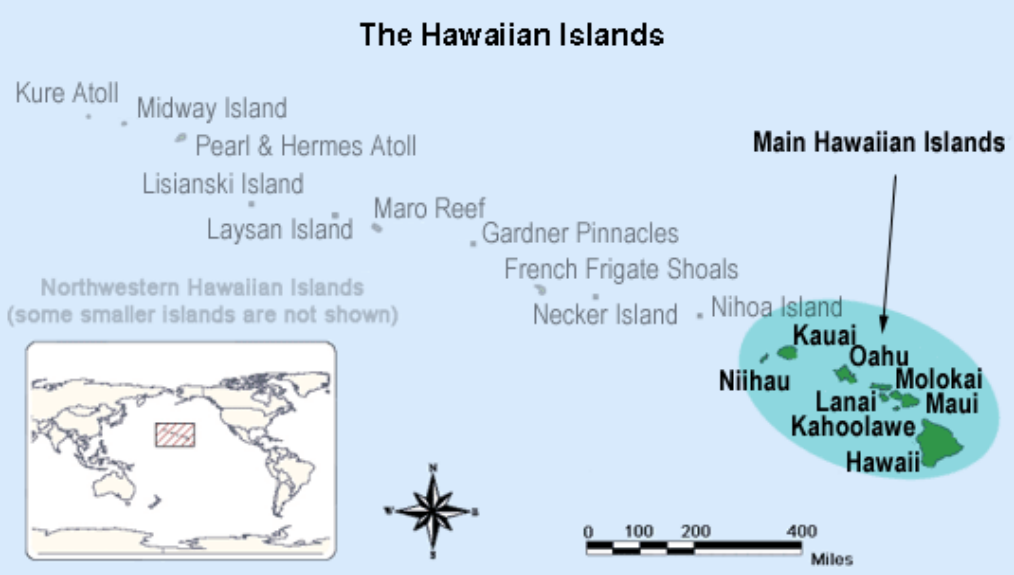
4. The response categories for this question were "not often at all," "slightly often," "moderately often," "very often," and "extremely often."

5. Response categories included "Florida," "Puerto Rico or the U.S. Virgin Islands," "Other Caribbean, Gulf of Mexico, or Atlantic Ocean locations," "Hawaii," "Pacific Ocean locations other than Hawaii," and "Other (specify)."

6. Rohmann et al. (2005) estimate that the MHI and NWHI represent approximately 7.6% of coral reefs within the U.S. territorial seas and the economic exclusive zone (inside the 10-fathom depth curve).

A map appears on Screen 12 to show respondents the location of the MHI. The text below the map communicates some basic information about the MHI and the reefs around them.



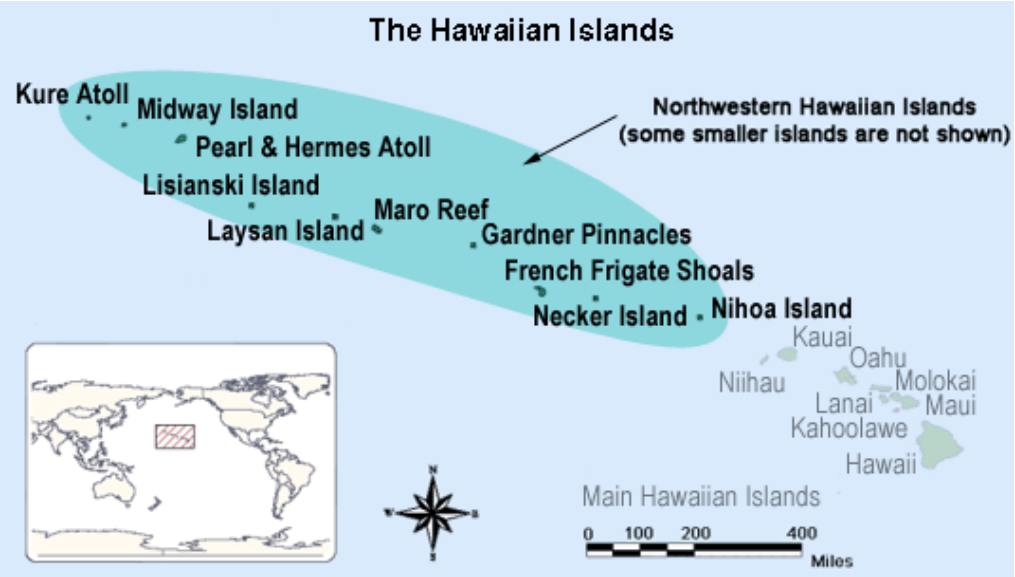
The Main Hawaiian Islands are eight larger islands, where nearly all of Hawaii's people live.[7]

- These islands are surrounded by about 300,000 acres[8] of coral reef ecosystem.
- These coral reefs are heavily used for recreation (fishing, boating, diving, and snorkeling), for commercial fishing, and for cultural and religious activities by native Hawaiian people.

Screen 13 then shows another map of the Hawaiian Islands that highlights the NWHI. The text below the map describes more about the NWHI. In order to evaluate respondents' preferences for restoration of coral reef ecosystems around the MHI, we felt that respondents needed to know about nearby coral reef ecosystems, particularly given that the coral reef ecosystems around the NWHI are in near pristine condition.

7. Friedlander et al. (2005).

8. Rohmann et al. (2005).



The Northwestern Hawaiian Islands consist of many small, mostly uninhabited islands that stretch 1,500 miles northwest of the Main Hawaiian Islands (about the same distance as from Miami to Boston).[9]

- These islands are surrounded by about 400,000 acres[10] of coral reef ecosystem.
- This area was made a National Monument in 2006.[11]

Screen 14 then asks whether respondents have ever lived in Hawaii.

Have you ever lived in Hawaii, or have you never lived in Hawaii?[12]

Screen 15 asks whether respondents have ever visited Hawaii.

Have you ever visited Hawaii, or have you never visited Hawaii?[13]

---

9. NOAA (2007) states that the NWHI extend for 2,000 kilometers, or about 1,242 miles (1,242 miles was rounded to 1,500 miles to give respondents a more familiar and comparable distance from Miami to Boston).

10. Rohmann et al. (2005).

11. Federal Register Notice (1998).

12. Response categories include "Yes, I have lived in Hawaii" and "No, I have never lived in Hawaii."

13. Response categories include "Yes, I have visited Hawaii" and "No, I have never visited Hawaii."

Screen 16 asks how likely respondents are to visit Hawaii in the next 10 years.

> In the next 10 years, how likely is it that you will go to Hawaii?[14]

The questions on Screens 14 through 16 are used to segment those whose values might include direct economic use value versus those whose values would hold pure passive economic use values.

On Screen 17, respondents see four scenes from coral reefs around Hawaii. These include pictures of schools of fish near reefs, sea urchins common in Hawaii, a variety of shallow coral, and giant trevally often seen in Hawaiian waters. These pictures provide a transition between answering questions and providing the next bit of information. These pictures were inserted to break up the survey with material that would maintain interest.

Schools of fish live near reefs

Sea urchins are common in Hawaii

A variety of shallow coral

Giant trevally are often seen in Hawaiian waters

14. Response categories include "I definitely will not go to Hawaii," "I probably will not go to Hawaii," "I may or may not go to Hawaii," "I probably will go to Hawaii," and "I definitely will go to Hawaii."

Screen 18 then highlights two reasons why coral reef ecosystems around Hawaii are unique: (1) 25% to 50% of the species found around the Hawaiian Islands do not occur anywhere else in the world and (2) the NWHI reefs are in a remote location and still in a relatively unaltered natural state (i.e., mostly untouched by humans).

> The coral reef ecosystems around the Hawaiian Islands are unique.
>
> · One-fourth to one-half of the many corals, fish, and other marine species found around the Hawaiian Islands are found nowhere else in the world.[15]
>
> · The Northwestern Hawaiian Island coral reefs are in a nearly natural condition; there are few large coral reef ecosystems anywhere in the world that remain so untouched by humans.

4.4 Section 4. Overfishing

This section introduces overfishing as the first of two main threats to coral reef health in the MHI.[16]

Screen 19 first describes what is meant by "overfishing" and the ways that it can affect annual catches of reef fish, size of fish, fish reproduction, and types of fish around the MHI.

> OVERFISHING
>
> Overfishing occurs when more fish are caught than an ecosystem can replace. Overfishing injures Hawaiian coral reef ecosystems.
>
> Because of overfishing around the Main Hawaiian Islands:
>
> · Total annual catches of reef fish have fallen by about 90%.
>
> · Few fish grow to be large.

15. See Gulko et al. (2000) and DeMartini and Friedlander (2004).

16. Clark and Gulko (1999) found that about 80% of nearshore fish in the MHI are overfished. Gulko et al. (2000) found that overfishing is one of the main threats to coral reefs on the MHI, particularly on O'ahu. Jennings and Kaiser (1998) and Jackson et al. (2001) also found that although pollution, coastal development, invasive species, and global climate change all impact coral reefs, fishing is the most pervasive and direct threat to coral reefs and other coastal ecosystems.

- Fish reproduction is low because there are fewer large fish. Large female fish produce more eggs.

- There are fewer plant-eating fish that keep algae from smothering the coral reefs. The coral reefs are less able to support other marine life and less able to recover from other stresses like storms or pollution.

Screen 20 then tells respondents that there is currently not a lot of fishing around the NWHI. As a result, the NWHI coral reef ecosystem has a more natural system with more fish and a larger variety of fish than the MHI coral reef ecosystem. Respondents also learn that the NWHI are permanently protected from overfishing due to its National Monument status.

Around the Northwestern Hawaiian Islands:

- Currently, there is very little fishing.

- This coral reef ecosystem is in a natural condition, with many more fish and a larger variety of fish than around the Main Hawaiian Islands.

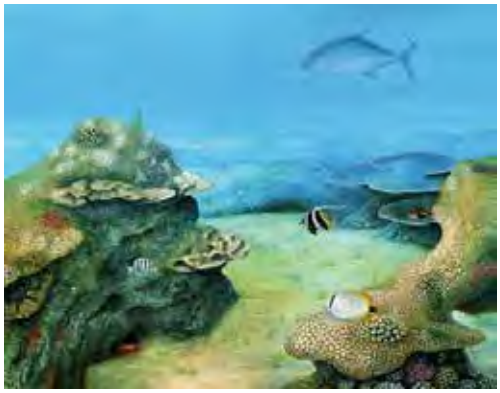
- Many large fish, seals, and other species at the top of the food chain still live here, whereas they have been greatly reduced around the Main Hawaiian Islands.

- As a National Monument administered by the federal government and the State of Hawaii, the Northwestern Hawaiian Islands are permanently protected from overfishing.

Drawings appear on Screen 21 to show respondents current conditions at the MHI and how the MHI looked before overfishing occurred. By seeing the two drawings side by side, respondents can see that under conditions before overfishing occurred, there were more reef fish and healthier coral ecosystems than under current conditions. Because overfishing is not occurring at the NWHI, a similar screen was not used to show a before-and-after shot for the NWHI.

The following drawings represent current conditions in the Main Hawaiian Islands and how they would have looked before overfishing.

Current conditions of coral reefs around the Main Hawaiian Islands



Conditions of coral reefs around the Main Hawaiian Islands before overfishing

A solution to the overfishing problem in the MHI – implementation of no-fishing zones – is then described on Screen 22. Respondents learn what no-fishing zones would do to reduce the impacts of overfishing, that this management tool has been effective in other locations such as Florida to help improve coral reef health, and that other activities such as recreational diving can still occur in no-fishing zones.

A SOLUTION TO OVERFISHING IN THE MAIN HAWAIIAN ISLANDS: NO-FISHING ZONES

No-fishing zones can be used to prevent or limit overfishing in the Main Hawaiian Islands. No-fishing zones are areas of the ocean where fishing is not permitted.

- Where overfishing has occurred, no-fishing zones will allow the number, size, and variety of fish to increase inside the zones.[17] More fish means that there will also be more seals, sea birds, and other marine life.

17. Gell and Roberts (2002) summarized results from 16 case studies around the world and found that marine reserves lead to increases in abundance, body size, biomass, and reproductive output of exploited species.

- When nearby areas remain open to fishing, fish from within no-fishing zones migrate and increase the number, average size, and varieties of fish in areas outside the no-fishing zones.[18]

- No-fishing zones have been effective in rebuilding coral reef ecosystems in other places such as Florida.[19]

- Snorkeling, diving, and similar activities are allowed in no-fishing zones.

The text on Screen 23 then highlights some undesirable consequences associated with developing no-fishing zones, including additional government spending, potential loss of commercial fishing jobs, and displacement of recreational fishing. Presenting this information demonstrates to respondents that protection comes at a cost.

> However, no-fishing zones can have undesirable effects:
>
> - Commercial fishing jobs may temporarily be lost until catches increase.
>
> - Recreational fishing has to be relocated away from the no-fishing zones.
>
> - Federal government spending on enforcement will be required because many of the reefs are managed by the federal government. The State of Hawaii will pay its fair share of enforcement costs for reefs in state waters.

Following the discussion of no-fishing zones, Screen 24 asks respondents whether they agree with statements about three issues: commercial fishing jobs, sport fishing opportunities, and federal government involvement.[20] This question serves two purposes. First, it breaks up the presentation of important information and, second, it provides additional information to assess respondents' preferences for protecting coral reefs via no-fishing zones.

> Below is a list of statements. Please indicate whether you strongly disagree, somewhat disagree, neither agree nor disagree, somewhat agree, or strongly agree with each of the following statements.

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18. Gell and Roberts (2002) find that in Florida, for example, recreational fishermen were catching larger fish outside the Merritt Island Wildlife Refuge.

19. Gell and Roberts (2002) cite that the Merritt Island National Wildlife Refuge, the Sanctuary Preservation Areas, and the St. Lucian reserves all provide benefits inside and outside the marine reserves.

20. The specific statements were: "Protecting jobs of commercial fishermen is more important than protecting Hawaiian coral reefs," "Protecting recreational fishing is more important than protecting Hawaiian coral reefs," and "The federal government should take an active role to protect Hawaiian coral reefs."

Next, Screen 25 tells respondents about a proposal to increase no-fishing zones from the current 1% to a new level of 25% of the coral reef ecosystems around the MHI.

OPTIONS TO INCREASE NO-FISHING ZONES AROUND THE MAIN HAWAIIAN ISLANDS

There are options for increasing no-fishing zones around the Main Hawaiian Islands. Currently, about 1%[21] of the coral reefs around the Main Hawaiian Islands are included in no-fishing zones. One option being discussed would increase the no-fishing zones around the Main Hawaiian Islands to 25%[22] of the coral reefs.

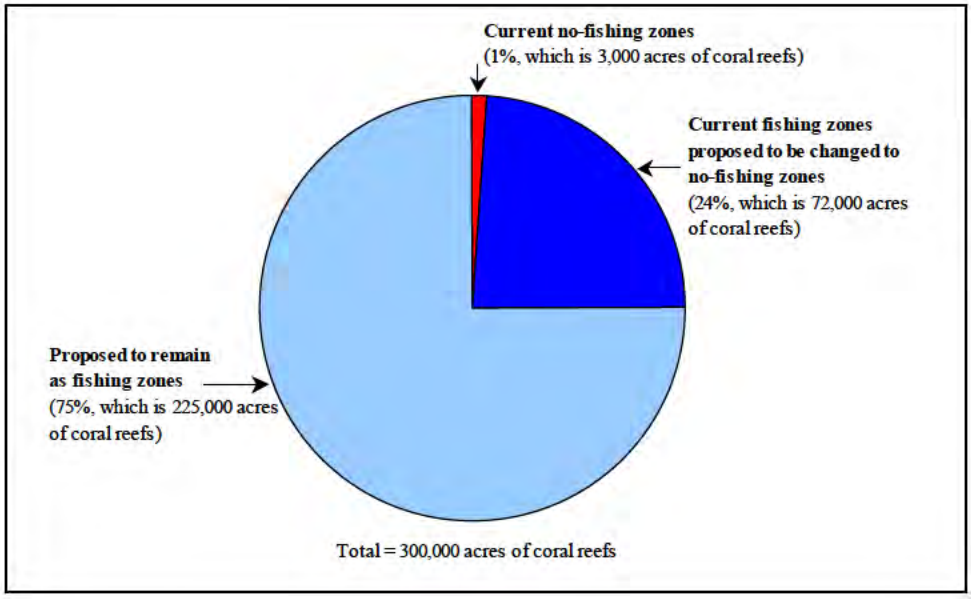
More details about this option are shown on the next screen.

Screen 26 uses a pie chart to show the current level of coral reefs protected by no-fishing zones in Hawaii (1%), the proposal to increase this area to 25% (an increase of 24%), and the proposed area that would be left unprotected by no-fishing zones (75%). In addition to presenting this information in percentage terms, the actual areas of ocean currently protected (3,000 acres), the additional area proposed to be protected (72,000 acres), and the area proposed to remain unprotected (225,000 acres) are also shown on the chart. Presenting this information in acres and percentages helps respondents understand the scale of the area that would be protected by the no-fishing-zones program.

21. Gulko et al. (2000). The actual figure is less than 1%, but we used "about 1%" as a baseline to simplify the scenario.

22. In order for these protected areas to provide any fisheries benefits, 20–30% of the reef area needs to be protected from exploitation (Sladek Nowlis and Roberts, 1999; Sladek Nowlis and Bollermann, 2002). Gell and Roberts (2002, p. 6) make a similar finding, "the most convincing success stories come from places in which between 10 and 35% of fishing grounds have been protected."

Main Hawaiian Islands Option: Increase no-fishing zones from current 1% up to 25% of coral reefs.



Screen 27 presents some advantages of increasing the area of no-fishing zones around the MHI, such as increasing the amount of fish and other marine life during the first three years, increasing the amount of fish caught outside the no-fishing zones within three to five years, increasing the total amount of reef fish caught each year, and improving the quality of recreation and the religious and cultural uses by the Hawaiian natives.

Some reasons for increasing no-fishing zones around the Main Hawaiian Islands:

- Inside the no-fishing zones, fish and other marine life would begin to increase during the first three years.[23]
- Beginning in three to five years after no-fishing zones are established, scientists expect that the amount of fish caught outside the no-fishing zones would begin to increase.[24]

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23. Polunin and Roberts (1993), Russ and Alcala (1996a, 1966b), Wantiez et al. (1997), and Gell and Roberts (2002) find that marine reserves generally produce detectable increases in fish after two to three years of protection.

24. Gell and Roberts (2002) find that benefits to fishermen can be detected as early as three to five years after protection.

- In about 10 years, the total amount of reef fish caught each year in the Main Hawaiian Islands would increase from 10% to about 50% of historic levels.

- The entire Main Hawaiian Island coral reef ecosystem would be healthier, support more marine life, improve the quality of recreation, and improve religious and cultural uses by native Hawaiians.

To balance out the information provided on Screen 27, Screen 28 presents some of the disadvantages of increasing the area of no-fishing zones around the MHIs, such as high enforcement costs and prohibition of commercial and recreational fishing within the no-fishing zone. Presenting the advantages as well as the disadvantages helps to ensure that a balanced and neutral presentation on these issues is given to respondents. This screen also reminds respondents that the NWHI are already protected from overfishing. The purpose of this last bullet is to remind respondents about substitutes. Theory and practice dictate that for respondents to reveal their true preferences, they need to be aware of such substitutes.

Some reasons for not increasing no-fishing zones around the Main Hawaiian Islands:

- Enforcement costs will be high. Part of the costs would be paid for by all U.S. taxpayers through increased federal taxes. The rest of the costs would be paid for by the State of Hawaii.

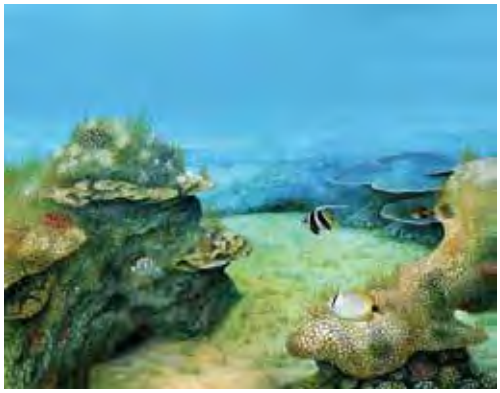
- Recreational and commercial fishing will not be allowed within the no-fishing zone.

- The coral reef ecosystem around the Northwestern Hawaiian Islands is already protected from overfishing.

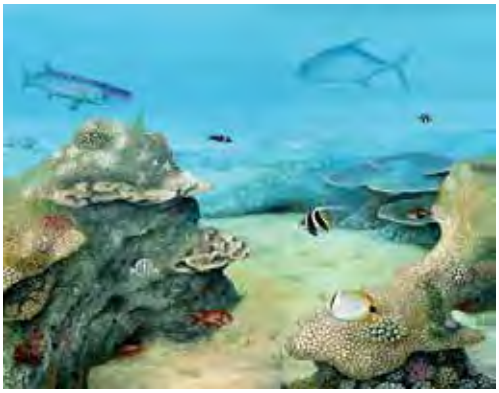
Screen 29 uses illustrations to compare conditions in 10 years (1) if no-fishing areas continue to protect only 1% of coral reefs and (2) if no-fishing areas are increased to protect 25% of coral reefs.

COMPARING CORAL REEF CONDITIONS AROUND THE MAIN HAWAIIAN ISLANDS

Conditions in about 10 years
if 1% of the coral reefs remain protected
by no-fishing zones



Conditions in about 10 years
if no-fishing zones are increased to
protect 25% of the coral reefs



Screen 30 then asks respondents if they have any comments about the information provided so far. Respondents typed their answers in the space provided. The purpose of this question was to give respondents an opportunity to express any thoughts about the material presented so far and to break up the flow of the survey.

Do you have any comments about the information provided so far?

4.5 Section 5. Ship Accidents

Section 5 introduces ship accidents as another threat to coral reefs around the MHI.

Screen 31 tells respondents more about the frequency of ship accidents. Ship accidents occur about 10 times a year in the MHI and can significantly impact a localized area of the reef.

SHIP ACCIDENTS

Ship accidents are another cause of injuries to coral reefs around the Main Hawaiian Islands.[25]

On average, about 10 accidents occur each year[26] where private and commercial boats and ships lose control, often in storms. While these ships rarely sink, they do damage coral reefs.

Screen 31 also presents four bullet points about ship accidents These bullet points explain where most ship accidents occur, the severity of injuries to coral reefs from these accidents, the amount of reefs injured in an average year, and the amount of time it takes for nature to fully repair these injuries. This section describes the effects of ship groundings in the MHI and highlights the fact that natural recovery of the reefs from these groundings typically takes about 50 years. During this time, a reef's health, and many of the coral reef-associated activities such as snorkeling and diving, may be affected. The ship grounding scenario provides a description of localized impacts on ecosystem health, contrasting with the broader effects associated with overfishing. It is included to help elicit a range of values for the types of management actions that are available to help improve coral reef health in the MHI.

- These accidents usually occur around the Main Hawaiian Islands, where most ship traffic occurs.
- Severe injuries to the coral reefs usually range from a few square feet to an acre (an acre is about the size of a football field).
- In an average year, a total of about 5 acres of coral reefs are injured around the Main Hawaiian Islands.
- It typically takes about 50 years for nature to fully repair these injuries.[27] This means that activities like fishing, diving, and snorkeling may be affected for many years.

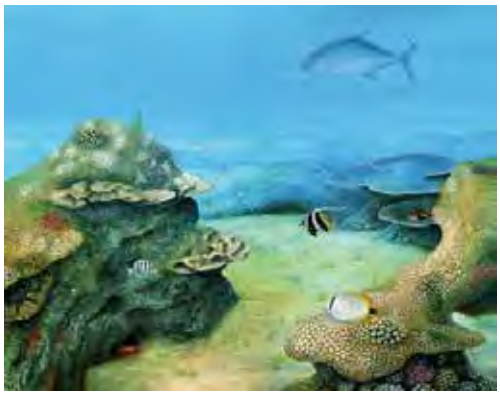
25. See Gulko (2002).

26. Based on the average number of reported vessel groundings between January 1998 and November 2001.

27. The value of 50 years was used based on discussions with a coral reef ecologist, Joe Shittone, at NOAA's Office of National Marine Sanctuaries (personal communication, September 16, 2004).

Screen 32 uses two illustrations to show respondents an (1) MHI coral reef without any damage from ship accidents and (2) MHI coral reef where a ship accident has occurred.

Main Hawaiian Island coral reefs where no ship accident has occurred



Area of coral reef where a ship accident has occurred

Screen 33 serves to break up the text and to see whether respondents have heard about, read about, or seen where ship accidents have injured coral reefs in Hawaii or elsewhere.

> Have you ever heard about, read about, or seen where ship accidents have injured coral reefs in Hawaii or elsewhere?[28]

Next, Screen 34 tells respondents that management actions, such as planting living coral from coral farms into injured areas and restoring injured coral that is still alive, could help the reef recover faster after ship accidents (10 years rather than 50 years). This section explains that these actions have been effective in other locations, such as Florida, in restoring the reefs in a much shorter period compared to natural recovery.

28. Response categories were "yes" and "no."

OPTIONS TO REPAIR CORAL REEFS INJURED FROM SHIP ACCIDENTS AROUND THE MAIN HAWAIIAN ISLANDS

Actions can be taken to help coral reefs recover faster after ship accidents, such as planting living coral from coral farms into injured areas and restoring injured coral that is still alive.

- With repairs, injured coral reefs typically recover in about 10 years, rather than in about 50 years with natural recovery.

- These types of repairs have been successful around Florida and elsewhere.

The next screen, Screen 35, tells respondents that the federal government, with the State of Hawaii, is considering a new program to repair ship injuries to coral reefs that would repair about 10 sites (about 5 acres) each year.

The federal government, with the State of Hawaii, is considering a program to repair ship injuries to coral reefs around the Main Hawaiian Islands. About 10 sites, totaling about 5 acres, would be repaired each year.

Respondents are told that it is not possible to make boat and ship owners pay for repairs because it is often difficult to track which ship caused the injury. This information helps avoid protest amongst respondents who think it was unfair for them to pay for the injuries because the boat and ship owners are responsible.

As part of the proposed program, boat and ship owners will be required to pay for such repairs. However, it is often not possible to find those who caused the injuries or to collect payment from the persons responsible.

To be consistent with the section on overfishing, the survey presents the advantages and disadvantages of the coral reef repair program. Screen 36 starts by presenting the advantages.

Some reasons for a coral reef repair program:

- These sites would recover in about 10 years, rather than in about 50 years with natural recovery.

- This program would help maintain Hawaii's coral reef ecosystems and would reduce the impacts from ship accidents to recreation and other activities.

Screen 37 lists some of the disadvantages of this program, such as the small amount of reefs repaired each year compared to the actual number of coral reefs around the MHI.

> Some reasons against a coral reef repair program:
>
> · Since the Main Hawaiian Islands have about 300,000 acres of coral reefs, 5 acres injured by ship accidents each year is only a very small percentage.
>
> · A program like this would require additional costs beyond what can be collected from the ship owners that caused the damage.
>
> · Part of the costs that are not paid by ship owners would be paid by all U.S. taxpayers through increased federal taxes. The rest of the costs would be paid by the State of Hawaii.

In order to break up the text, Screen 38 then asks respondents if they have any comments about the information provided so far.

> Do you have any comments about the information presented so far?

4.6 Section 6. Stated-Preference Questions and Follow-up Evaluation

In Section 6, respondents are asked to identify which combination, if any, of the management actions they prefer. The two management actions (no-fishing zones and restoration of ship accident damages) are summarized, and a series of SP questions is asked.

Screen 39 first reminds respondents who reported that they could hear the audio clip from Screen 3 to make sure their speakers are turned on.[29] This screen also provides instructions for re-playing or pausing the audio.

> For the next few screens you will be provided with some audio instructions. Please make sure your audio is turned on.
>
> If you want to listen to the audio again, press the "Play" button that looks like this: ► on the upcoming screens. If you want to pause the audio, click the button that looks like this: ❚❚.

29. This screen is shown only to those respondents who answered "yes" to the question on Screen 4.

Next, Screen 40 introduces the concept of choosing among alternative programs.

Which Program Do You Prefer?

> The following questions ask you to choose among alternative programs that have different combinations of actions to protect and restore coral reef ecosystems around the Main Hawaiian Islands, at different costs to you.

Introductions of the programs begin on Screen 41 with a description of the Current Program, or the status quo, via text shown on the screen and audio.[30] In addition to teaching respondents about the Current Program, this screen teaches respondents how to read the choice tables. Row 1 always presents the percent of coral reefs (and corresponding acres in parentheses) protected by no-fishing zones. Row 2 always presents the acres of coral reefs repaired from ship injuries per year. The last row always shows the added federal taxes paid by households each year. For the Current Program, 1% of coral reefs are protected by no-fishing zones, no acres of coral reefs are repaired from ship injuries, and $0 would be added to federal taxes each year.

> *In each question, the Current Program describes the reef management actions that are currently in place and the expected results if these are continued.*
>
> *In Row 1: The Main Hawaiian Islands no-fishing zones are kept at the current 1% of the coral reefs. The number of fish and the quality of the reefs will continue to decline.*
>
> *In Row 2: Ship injuries to coral reefs around the Main Hawaiian Islands are not repaired. Currently, ship accidents injure about 5 acres each year. It takes about 50 years for these reefs to recovery naturally.*

	Current Program
% of coral reefs protected from no-fishing zones. (acres)	**1% protected** **(3,000 acres)** Declining marine life.
Acres of coral reefs repaired from ship injuries per year.	**No acres repaired** Injuries last about 50 years
Added federal taxes paid by your household each year	$0

30. The audio recording on Screen 41 reads the text in italics to respondents who said they could hear the audio clip from Screen 3. These respondents also saw the text in addition to hearing it. Respondents without audio capability only saw the text on this screen.

The last row shows the additional cost paid by your household each year: With the current program, there will be no additional actions, and therefore no added federal taxes paid by your household to protect and restore coral reef ecosystems around the Main Hawaiian Islands.

When you are finished reviewing this table click on the NEXT button

The first choice question is presented to respondents on Screen 42. This screen explains the Current Program and the three alternative programs using bullets as well as a table. Additionally, those with audio capabilities hear the text in italics via the audio clip. The Current Program is always the status quo: no new no-fishing zones in the MHI, no additional efforts to restore vessel grounding damages, and no additional taxes. The Full Program includes a combination of increasing no-fishing zones in the MHI to 25% and repairing 5 acres of reefs injured because of ship strikes each year, which results in the greatest increase in new taxes. The No-Fishing Zones Program protects 25% of coral reefs around the MHI, and the Reef Repair Program repairs 5 acres of coral reefs each year damaged by ship accidents. Both programs involve some increase in taxes.

The table below includes the Current Program and three alternative programs that do more and cost more than the Current Program.[31]

The three alternatives to the Current Program are: the No-Fishing Zone Program; the Ship Repair Program; and the Full Program.

The Full Program is summarized on the far right hand side of the table[32]*:*

- *The Full Program protects 25% of the coral reefs from overfishing AND each year repairs 5 acres of coral reefs from ship accidents.*

31. The Current Program is always shown on the far left-hand side of the table.

32. The Full Program is always shown on the far right-hand side of the table.

In between the Current Program and the Full Program the two other alternative programs are summarized.[33]

- *The No-Fishing Zones Program: This program would protect 25% the coral reefs around the Main Hawaiian Islands, but would do nothing to repair reef damage from ship accidents.*

- *The Ship Repair Program: This program would repair 5 acres of coral reefs from ship accidents each year, but would do nothing more to protect coral reefs from overfishing.*

Each of these alternatives to the Current Program would cost your household additional federal taxes each year as shown in the bottom of the table.

Respondents are reminded to consider the effectiveness of each management option, the cost, and the other things they could spend the money on instead.

Remember, if you spend money for one of the programs that does more, that money won't be available for you to buy other things. If you do not want to do more and spend more to protect coral reefs in the Main Hawaiian Islands, you should check the Current Program as your most preferred program.

Respondents are asked to specify which of the four programs is their most preferred by checking one box.[34] The text just before the table on Screen 42 explains that the highlighting represents where the program actions are different from the Current Program.

After you carefully review the four programs, and the costs to your household under each program, please check which of the four programs you most prefer.

The highlighted boxes show where the program actions are different from the current program.

33. The order in which the No-Fishing Zone and Reef Repair programs were shown in the table was randomized.

34. If respondents click "next" before choosing a program, they will be directed again to Screen 42 with a note at the top asking them to please answer the question.

	Current Program	**Reef Repair Program**	**No-Fishing Zones Program**	**Full Program**
% of coral reefs protected by no-fishing zones (acres)	**1% protected (3,000 acres)** Declining marine life	**1% protected (3,000 acres)** Declining marine life	**25% protected (75,000 acres)** Increasing marine life More fish caught outside zone	**25% protected (75,000 acres)** Increasing marine life More fish caught outside zone
Acres of coral reefs repaired from ship injuries per year	**No acres repaired** Injuries last about 50 years	**5 acres repaired** Injuries last about 10 years	**No acres repaired** Injuries last about 50 years	**5 acres repaired** Injuries last about 10 years
Added federal taxes paid by your household each year[35]	$0	$55	$45	$100
Which program is your most preferred?	c	c	c	c

Once you are done reviewing these alternative programs, please check the box for the program you most prefer.

As part of the survey design process, we developed an experimental design that identifies 16 versions of the choice question. See Appendix B for the full experimental design for this study.

As has become standard practice in SP studies, we introduce a "certainty question" to gauge how certain respondents are of their answers. As part of the survey design, we randomly assigned respondents to one of three certainty question formats: a certainty question after each choice

35. The table provided here is an example of 1 of the 16 versions of the survey. The only attribute that varies between each version is the cost. The Current Program is always $0 and the alternative programs are always greater than $0.

question, after just the first choice question, or after just the last choice question.[36] After respondents choose their most preferred program on Screen 42, Screen 43 shows them their selection and asks how sure they are that among the four alternatives presented, the program they chose is their most preferred. Answers to this question allow the research team to better understand the overall confidence that respondents had in their answers and whether respondents were taking the choice task seriously.

The table below provides an example of what the table and certainty question looked like, assuming a respondent chose the Reef Repair Program as their most preferred of all four programs.

	Current Program	**Reef Repair Program**	**No-Fishing Zones Program**	**Full Program**
% of coral reefs protected by no-fishing zones (acres)	**1% protected (3,000 acres)** Declining marine life	**1% protected (3,000 acres)** Declining marine life	**25% protected (75,000 acres)** Increasing marine life More fish caught outside zone	**25% protected (75,000 acres)** Increasing marine life More fish caught outside zone
Acres of coral reefs repaired from ship injuries per year	**No acres repaired** Injuries last about 50 years	**5 acres repaired** Injuries last about 10 years	**No acres repaired** Injuries last about 50 years	**5 acres repaired** Injuries last about 10 years
Added federal taxes paid by your household each year	$0	$55	$45	$100
Which program is your most preferred?		**X**		

36. Fifty percent of respondents see a certainty question after each choice question, 25% see one after just the first choice question, and 25% see one after just the third choice question.

> You chose the Reef Repair Program as your most preferred program of these four programs. How sure are you that among these four programs, the Reef Repair Program is your most preferred?[37]

Screen 44 then asks respondents to provide a brief comment explaining why they chose the program they did. This information can help distinguish between true zero values and protest answers. This question also provides a space for respondents to comment on their answers to the first choice question. This can provide insights into the individual's thought process and subsequently help identify valid and invalid responses. Third, it provides the opportunity for individuals to express how they feel about being asked this type of question. This is especially important for those respondents who clearly dislike some element of the question. This comment question is not repeated for other choice questions because experience indicates little additional information is gained from repeating the question.

> Please provide a brief comment that helps us understand why you chose the Reef Repair Program as your most preferred.[38]

Next, Screen 45 presents respondents with the three programs they did not choose as their most preferred from Screen 42 and asks them to check which of the remaining three programs they prefer.

37. Response categories include "Not sure at all," "Slightly sure," "Moderately sure," "Very sure," and "Extremely sure."

38. Appendix I provides a full listing of the open-ended responses to this question for both panels.

Now that you have told us which program you most prefer, consider the remaining three programs. Of the remaining three programs, which program do you prefer?[39]

	Current Program	**No-Fishing Zones Program**	**Full Program**
% of coral reefs protected by no-fishing zones (acres)	**1% protected (3,000 acres)** Declining marine life	**25% protected (75,000 acres)** Increasing marine life More fish caught outside zone	**25% protected (75,000 acres)** Increasing marine life More fish caught outside zone
Acres of coral reefs repaired from ship injuries per year	**No acres repaired** Injuries last about 50 years	**No acres repaired** Injuries last about 50 years	**5 acres repaired** Injuries last about 10 years
Added federal taxes paid by your household each year	$0	$45	$100
Of these three, which program do you prefer?	C	C	C

39. If the respondent chose the Current Program on Screen 42, he/she received an alternate wording here. The alternate wording is, "You chose the Current Program with no additional cost to your household as your most preferred program. If you had to choose among the remaining three programs, which would you prefer?" The purpose of this alternate wording is to acknowledge that a respondent who chose the Current Program as his/her first choice did not want the government to take any further actions, even though the choice format forces him/her to rank the remaining three alternatives.

Fifty percent of respondents saw Screen 46, which asks them again how sure they were that among the remaining three choices, the one they chose on Screen 45 is their most preferred.

	Current Program	**No-Fishing Zones Program**	**Full Program**
% of coral reefs protected by no-fishing zones (acres)	**1% protected (3,000 acres)** Declining marine life	**25% protected (75,000 acres)** Increasing marine life More fish caught outside zone	**25% protected (75,000 acres)** Increasing marine life More fish caught outside zone
Acres of coral reefs repaired from ship injuries per year	**No acres repaired** Injuries last about 50 years	**No acres repaired** Injuries last about 50 years	**5 acres repaired** Injuries last about 10 years
Added federal taxes paid by your household each year	$0	$45	$100
Of these three, which program do you prefer?		**X**	

You chose the No-Fishing Zone Program as your most preferred program of these three programs. How sure are you that among these three programs, the No-Fishing Zone Program is your most preferred?[40]

The final choice question is presented on Screen 47. It asks respondents which program they prefer of the remaining two programs. Asking respondents to identify their most preferred and next most preferred, and then their preferred from the remaining two programs, provides a complete ranking of all the programs in each choice set. Complete rankings provide potent information on preferences that will be very useful in data analysis and value estimation.

40. Response categories include "Not sure at all," "Slightly sure," "Moderately sure," "Very sure," and "Extremely sure."

Of the remaining two programs, which program do you prefer?[41]

	Current Program	**Full Program**
% of coral reefs protected by no-fishing zones (acres)	**1% protected (3,000 acres)** Declining marine life	**25% protected (75,000 acres)** Increasing marine life More fish caught outside zone
Acres of coral reefs repaired from ship injuries per year	**No acres repaired** Injuries last about 50 years	**5 acres repaired** Injuries last about 10 years
Added federal taxes paid by your household each year	$0	$100
Of these two, which program do you prefer?	C	C

41. If a respondent chose the Current Program on Screen 42, he/she would see alternate wording, "If you had to choose between the remaining two programs, which would you prefer?"

Screen 48 presents the final certainty question. Twenty-five percent of respondents saw this question only after the third choice question.

	Current Program	Full Program
% of coral reefs protected by no-fishing zones (acres)	**1% protected (3,000 acres)** Declining marine life	**25% protected (75,000 acres)** Increasing marine life More fish caught outside zone
Acres of coral reefs repaired from ship injuries per year	**No acres repaired** Injuries last about 50 years	**5 acres repaired** Injuries last about 10 years
Added federal taxes paid by your household each year	$0	$100
Of these two, which program do you prefer?	X	

> You chose the Current Program as your most preferred program of these two programs. How sure are you that between these two programs, the Current Program is your most preferred?

4.7 Section 7. Debriefing Questions

This final section of the survey presents respondents with a series of questions to determine what they were thinking when they chose their most preferred programs. It also asks several attitudinal and other types of questions.

Screen 49 begins this section by telling respondents that they will be asked some questions about what they were thinking when choosing the programs they prefer.

> Following are some questions about what you were thinking when you chose your preferred programs.

Screen 50 asks respondents whether they believe overfishing has caused the changes in coral reefs they were told about earlier.

> When you chose your most preferred programs, did you think that overfishing contributed to the changes in Hawaii's coral reef ecosystems we told you about or did you think it did not contribute to those changes?[42]

Screen 51 then asks how serious the effects of overfishing would be without additional no-fishing zones.

> If no-fishing zones are NOT put in place, how serious did you think the effects of overfishing would be on the coral reef ecosystem around the Main Hawaiian Islands? [43]

Screen 52 asks how effective no-fishing zones would be if adopted.

> When you chose your preferred programs, how effective did you think that no-fishing zones would be in restoring fish and other marine life in the coral reef ecosystem around the Main Hawaiian Islands?[44]

With respect to ship accidents, Screen 53 asks the respondents to evaluate how serious the effects of ship accidents are on the MHI coral reef ecosystem.

> When you chose your preferred programs, how serious did you think the effects of ship accidents are on the overall health of the coral reef ecosystem around the Main Hawaiian Islands? [45]

Screen 54 asks respondents how effective they thought the Reef Repair Program would be in speeding up recovery.

> When you chose your preferred programs, how effective did you think that repairing injuries from ship accidents would be in speeding up recovery of the coral reef ecosystem around the Main Hawaiian Islands? [46]

---

42. Response categories include "Overfishing did contribute to the changes" and "Overfishing did not contribute to the changes."

43. Response categories include "Not serious at all," "Slightly serious," "Moderately serious," "Very serious," and "Extremely serious."

44. Response categories include "Not effective at all," "Slightly effective," "Moderately effective," "Very effective," and "Extremely effective."

45. Response categories include "Not serious at all," "Slightly serious," "Moderately serious," "Very serious," and "Extremely serious."

46. Response categories include "Not effective at all," "Slightly effective," "Moderately effective," "Very effective," and "Extremely effective."

Screen 55 asks respondents if they thought recovery would take more than, less than, or about 10 years under the Reef Repair Program.

> When you chose your most preferred programs, did you think that repairs of injuries to coral reefs after ship accidents would help reefs recover in about 10 years, more than 10 years, or less than 10 years?[47]

The questions asked on Screens 56 and 57 are used to evaluate the validity of the survey instrument. These questions elicit respondent attitudes about the proposed programs in the instrument, various groups and institutions in the Unites States, and their environmental attitudes.

> When you chose your most preferred programs, did you think that your household would pay the tax amount stated, or did you think you would pay more than that amount, or less than that amount?[48]

Screen 57 asks respondents how much confidence they have in the people who run the U.S. government, university scientists, large corporations, and newspapers.

> Please tell us how much confidence you have in the following groups and institutions in this country. In general, would you say you have no confidence at all, a little confidence, a moderate amount of confidence, a lot of confidence, or a great deal of confidence in[49]:

Screen 58 asks how respondents feel about increasing federal taxes to protect coral reefs around the MHI.

> How do you feel about increasing federal taxes to protect coral reefs around the Main Hawaiian Islands?[50]

Screen 59 asks whether respondents would like to pay for new programs through higher income taxes or through higher prices.

---

47. Response categories include "About 10 years," "More than 10 years," and "Less than 10 years."

48. Response categories include "The amount stated," "More than the amount," and "Less than the amount."

49. Response categories include "No confidence at all," "A little confidence," "A moderate amount of confidence," "A lot of confidence," and "A great deal of confidence."

50. Response categories include "Strongly oppose," "Somewhat oppose," "Neither oppose nor favor," "Somewhat favor," and "Strongly favor."

> There are different ways for people to pay for new programs to protect the environment. One way is for the government to pay the cost. This will raise everyone's taxes. The other way is for businesses to pay the cost. This will make prices go up for everyone.
>
> If you had to choose, would you prefer to pay for new environmental programs through higher income taxes or through higher prices?[51]

Screen 60 asks respondents to indicate whether, and to what extent, they think of themselves as environmentalists.

> Would you say you think of yourself as not an environmentalist at all, slightly an environmentalist, a moderate environmentalist, a strong environmentalist, or a very strong environmentalist?[52]

Screen 61 asks respondents to state how they react to several statements provided below the question. The statements were (1) cost should not be a factor when protecting the environment; (2) I found it difficult to select which programs I preferred; (3) there was not enough information for me to make informed decisions about doing more to protect coral reefs in Hawaii; (4) I was concerned that the federal government cannot effectively manage coral reefs; (5) I should not have to pay more federal taxes to protect coral reefs around Hawaii; and (6) the public's views as expressed in this survey should be important to the government when it chooses how to manage coral reefs in Hawaii.

> We would like to learn more about how you reacted to the questions that asked you to choose between various combinations of no-fishing zones and ship accident repair programs. Please indicate whether you strongly disagree, somewhat disagree, neither agree nor disagree, somewhat agree, or strongly agree with each of the following statements.[53]

51. Response categories include "Through higher income taxes," "Through higher prices," and "No preference."

52. Response categories include " Not an environmentalist at all," "Slightly an environmentalist," "A moderate environmentalist," "A strong environmentalist," and "A very strong environmentalist."

53. Response categories include "Strongly disagree," "Somewhat disagree," "Neither agree nor disagree," "Somewhat agree," and "Strongly agree."

Screen 62 asks whether anyone in their household paid any federal income taxes in 2008. If respondents clicked the next button before answering this question, they were diverted back to Screen 62 and asked to answer the question. If they refused for the second time, they were diverted to Screen 63.

> Did anyone in your household pay any federal income taxes last year, 2008?[54]

Screen 63 provides respondents with an opportunity to provide any remaining comments about the survey.

> Please add any other comments you would like to make to help us understand your views about coral reefs in Hawaii and your responses to this survey.

Screen 64 asked if respondents took this survey via WebTV or a personal computer.

> Are you taking this survey via a WebTV or a personal computer (PC)?[55]

This is followed by a question on Screen 65 that asks for information on the equipment used by respondents to participate in the survey. This will allow assessment of differences in survey responses by capabilities in receiving survey information.

> How is your computer (i.e., the computer via which you are taking this survey) connecting to the Internet?[56]

Finally, Screen 66 reminds respondents that the survey is eliciting information useful to NOAA and other agencies to estimate the value of coral reef ecosystems; it does not necessarily represent actual government policy. These statements were developed in consultation with the State of Hawaii and NOAA's National Marine Sanctuary Program (NMSP). Peer reviewers were adamant that these statements not be presented until respondents had completed and submitted their survey responses.

> To be sure we are clear …
>
> The National Oceanic and Atmospheric Administration, in cooperation with other federal and state agencies, is looking at ways to help protect coral reef ecosystems around the Hawaiian Islands. A wide variety of options are possible, in addition to the ones

54. Response categories include "Yes," "No," and "Not sure."

55. Response categories include "WebTV" and "PC."

56. Response categories include "Dialup modem," "ISDN line," "Cable modem," "Digital Subscriber Line (DSL)," "Wireless," "Satellite Dish," and "T1/T3 Line."

discussed in this survey. Any future decisions on specific protection and enhancement alternatives will take into consideration the views of the public, the results of scientific studies, and advice of marine and other scientific experts.

Screen 67 thanks respondents for participating and reassures them that all of their answers were recorded. It also lets them know that they will receive their check in the mail soon after they complete the survey.

> Thank you very much! We have recorded all of your responses. They are very important to us, and as a small thank-you, we will mail a $10 check to you soon. We look forward to your next survey, for July, later in the month.
>
> If you have any comments about any part of the survey, please write them below.

The final screen in the survey, Screen 68, again thanks respondents for completing the survey. Once the respondents see this screen, they can no longer go back to review their responses.

> Thank you for completing this survey. We have successfully received your responses.

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