

Instructions for Reviewers for the Survey

The survey will be conducted online, providing an opportunity to tailor the questions to each respondent. Not every respondent in the sample will answer every possible question on the survey, which creates many branching and skipping patterns within the survey. This collection consists of a set of 4 forms. Each of the forms represents a survey “path” for each the four main respondent groups:

1. Present users of Landsat imagery
2. Present users of other moderate-resolution imagery
3. Past users of moderate-resolution imagery (who no longer use moderate-resolution imagery)
4. Users of high- and low-resolution imagery (who have never used moderate-resolution imagery)

Each path includes all of the questions a respondent could possibly answer within that path. However, each survey path is designed so that the respondent will not necessarily answer every single question. The survey software (Key Survey™) will automate the skipping process so that the respondents will not have to take the time to navigate the skipping pattern. In this annotated version of the survey there are arrows after certain answer choices (throughout) that will direct the reviewer to the next question in the skipping sequence. If there is no arrow next to an answer, the reviewer should go directly to the next question.

In response to question 2 in the PRA Supporting Statement Part A, we have justified the questions in this survey. Throughout the survey we have included text in shaded boxes. These boxes provide the required justification and additional information for groups of questions or individual questions.

Survey Path 1: Present Users of Landsat Imagery

All respondents will receive the same instructions and will answer questions 1 and 2 below. The responses to these two questions will direct the respondents to the appropriate path to complete the survey. Due to the automated nature of Key Survey™ it is not possible at this time to write separate instructions for each of the paths. Therefore, we have provided an estimate of the time it would take for any of the respondents to complete the survey.

Thank you for participating in this study of moderate-resolution satellite imagery. Your input will help the USGS understand how moderate-resolution imagery is being used. Your responses will also clarify current and potential applications of this imagery.

This survey will take approximately 15 to 35 minutes to complete, depending upon the type of moderate-resolution imagery you use. You can pause at any time; simply close the window and your answers will be saved. To resume and complete the survey, you will need to click on the link to the survey in the email you received. At that point, you can answer any remaining questions and/or edit any of your previous responses. At the end of the survey, click on the “Submit” button to finish the survey. All responses will be kept confidential and will not be linked to your email address.

This survey was approved by the Office of Management and Budget (1028-XXXX).

Section 1: Your Use of Moderate-resolution Imagery_

The primary purpose of this section is to find out the types of satellite imagery the respondents are currently using and how they are using the images they are acquiring. The responses to Questions 1, 2 and 4 will be used to determine the subsequent survey path each respondent will follow.

Questions 1 and 2 will help the USGS to characterize the community of moderate-resolution imagery users by ascertaining if respondents are currently using moderate-resolution imagery. This information is necessary to determine subsequent questions each respondent will be asked.

Please tell us about the type of satellite imagery you use, and how and why you use it.

Q1

For the purposes of this study, moderate-resolution imagery:

- covers relatively large geographic areas (>60 km²),
- has a spatial resolution between 5 and 120 m,
- is characterized by repetitive coverage, and
- includes measurements from several portions of the electromagnetic spectrum.

Moderate-resolution imagery is collected by Landsat, SPOT, ASTER, Resourcesat, CBERS, and other missions. To see examples of products based on moderate-resolution imagery, [click here](#) (Note to reviewers: the following box will pop up if respondents click on the underlined text).

Examples of products based on moderate-resolution imagery include:

- National Land Cover Database
- LandFire and Gap Analysis Project vegetation maps

- Wildfire burn severity maps produced by the USGS
- Coastal Zone Analysis Program land cover change products
- USDA National Agricultural Statistical Service crop type maps
- FireLine from Insurance Services Office (ISO)
- Google Earth (moderate-resolution combined with higher-resolution imagery)

Based on the definition above, have you ever used, processed, or supplied moderate-resolution imagery in your work? *Please check only one.*

- Yes
- No → Respondent will be automatically directed to **survey path 4 for users of high- and low-resolution imagery**
- Don't know → *END of survey*

Q2

Have you used moderate-resolution imagery in the past year? *Please check only one.*

- Yes
- No → Respondent will be automatically directed to **survey path 3 for past users of moderate-resolution imagery**

Question 3: The USGS will use this information to examine differences in the current uses of imagery, as well as the requirements for the imagery to be useful. The USGS will be better able to provide imagery which suits the needs of various groups with this information.

Q3

Which of the following describe(s) your work with moderate-resolution imagery? *Please check all that apply.*

- I process imagery (e.g., developing algorithms).
- I apply imagery to answer questions or solve problems (e.g., conducting research or teaching).
- I make decisions based on imagery or products derived from imagery.
- I provide or sell imagery (e.g., basic imagery, post-processed imagery, or value-added services or products).
- I develop software for processing or manipulating imagery (e.g., ERDAS or ENVI).

Questions 4 and 5 are necessary to distinguish Landsat users from users of other moderate-resolution imagery. Question 4 determines the survey path respondents will take. Question 5 will help the USGS determine how dependent on Landsat imagery the users in the community are, which is a measure of the value of the imagery. It also provides information on what other imagery is fulfilling users' needs that Landsat may not be.

Q4

What type(s) of moderate-resolution imagery have you used in the past year? *Please check only one.*

- Landsat only → Q6
- Landsat and other imagery (e.g., SPOT, CBERS, Resourcesat)
- Other imagery only (e.g., SPOT, CBERS, Resourcesat) → *Respondent will be automatically directed to **survey path 2 for present users of other moderate-resolution imagery***

Q5

What is the amount of moderate-resolution imagery, expressed as a percent of total imagery, that you have used in the past year from the following satellites?

Please enter a number from 0 to 100 on each line. The total must equal 100.

Landsat (TM, ETM+, MSS)	_____
Terra (ASTER)	_____
CBERS (CCD)	_____
Resourcesat (IRS, LISS, AWiFS)	_____
SPOT (HRVIR, HRG, HRS)	_____
ALOS (AVNIR-2)	_____
Other (please specify) _____	_____
Total	_____

Questions 6-12 are designed to understand past and future trends in the use of Landsat imagery. Understanding the likelihood of increased or decreased use is critical to the USGS for planning future satellite missions and providing relevant current imagery.

Q6

Within the past 10 years, how would you characterize your use of Landsat imagery? *Please check only one.*

- My use has increased. → Q9
- My use has stayed more or less the same. → Q10
- My use has decreased.
- I cannot characterize my use within the past 10 years. → Q10

Q7

What are the reason(s) your use of Landsat imagery has decreased **within the past 10 years**? *Please check all that apply.*

- The scan line corrector anomaly (SLC-off) on Landsat 7 impacted data usability.
- My work has not required as much Landsat imagery. → Q10
- Landsat imagery has not been easily accessible. → Q10
- Landsat imagery has not been readily available. → Q10
- The cost of Landsat imagery had been too high. → Q10

- Data quality has been insufficient for my needs. → Q10
- Licensing or distribution restrictions have been problematic. → Q10
- The spatial resolution has not met my needs. → Q10
- The available spectral bands have not met my needs. → Q10
- The temporal resolution/frequency of coverage has not met my needs. → Q10
- New or existing sources of other imagery became more attractive. → Q10
- Other (please specify) _____ → Q10

Q8

You indicated that the scan line corrector anomaly (SLC-off) on Landsat 7 impacted data usability. How have you dealt with this problem? *Please check all that apply.*

- I use gap-filled Landsat 7 imagery. → Q10 (all answers)
- I have replaced Landsat 7 imagery with imagery from Landsat 5.
- I have replaced Landsat 7 imagery with moderate-resolution imagery from other satellite sensors.
- I have replaced Landsat 7 imagery with other kinds of data, such as data from fieldwork or other data sets.
- I still use some non-gap-filled Landsat 7 imagery.

Q9

What are the reason(s) your use of Landsat imagery has increased **within the past 10 years**? *Please check all that apply.*

- The imagery became more affordable.
- My work has required more imagery.
- Other (please specify) _____

Q10

In the next 5 years, how will your use of Landsat imagery likely change? *Please check only one.*

- My use will increase. → Q12
- My use will stay the same. → Q13
- My use will decrease.
- I will no longer use Landsat imagery.
- I cannot characterize my use over the next 5 years. → Q13

Q11

What are the reason(s) your use of Landsat imagery will likely decrease or cease **in the next 5 years**? *Please check all that apply.*

- My work will not require as much Landsat imagery. → Q13 (all answers)
- The data will not be easily accessible.
- The data will not be readily available.
- Licensing or distribution restrictions will continue to be a problem.

- Data quality will not be sufficient.
- The temporal resolution/frequency of coverage will not meet my needs.
- The available spectral bands will not meet my needs.
- The spatial resolution will not meet my needs.
- New or existing sources of other imagery will become more attractive.
- Current/new Landsat imagery may no longer be available.
- Other (please specify) _____

Q12

What are the reason(s) your use of Landsat imagery will likely increase **in the next 5 years**?

Please check all that apply.

- The imagery is now available at no cost.
- My work will require more imagery.
- Other (please specify) _____

Section 2: How You Use Moderate-Resolution Imagery

This section explores more specifically the ways in which respondents are using Landsat imagery, as well as the benefits which may accrue from projects using the imagery. The USGS will be able to determine some of the qualitative benefits of Landsat imagery from the latter questions.

Please answer the following questions in terms of your own projects **in the past year**, rather than those of your entire organization, unless otherwise requested.

Questions 13 and 14 further characterize the ways in which Landsat imagery is being used. This information will be used by the USGS to understand the scope of the use of Landsat imagery and thus the value of the imagery.

Q13

At what scales have your projects that have used Landsat imagery occurred? *Please check all that apply.*

- Local (e.g., county, municipal)
- State/Province
- Regional (e.g., multi-state, multi-province)
- National
- Continental
- Global

Q14

In what regions were these projects focused? *Please check all that apply.*

- United States
- Canada
- Mexico
- Antarctic
- Arctic
- Africa
- Asia
- Australia
- Europe
- Middle East
- South or Central America

Question 15 is included to separate U.S.-based users from internationally-based users. While the opinions of international users are also important to the USGS, the current effort is focused on U.S.-based users because information about U.S. users is more relevant for the purposes of this information collection than information about users outside the borders of the U.S.

Q15

Regardless of where your projects are located, are you located in the United States? *Please check only one.*

- Yes
- No

Questions 16 and 17 will help the USGS determine the breadth of applications of Landsat imagery, thus helping to ascertain the value of the imagery and to demonstrate the potential of the imagery in various fields.

Q16

What is the **primary** application for which you have used Landsat imagery? *Please check only one.*

- Agricultural forecasting
- Agricultural management/production/conservation
- Biodiversity conservation
- Climate science/change
- Coastal science/monitoring/management
- Ecological/ecosystem science/monitoring
- Fish and wildlife science/management
- Fire science/management
- Forest science/management
- Geology/glaciology
- Land use/land cover change
- Oil and gas/mineral exploration/extraction

- Range/grassland science/management
- Recreation management
- Water resources (e.g., watershed management, water rights, hydrology)
- Rural planning and development (e.g., zoning, economic development, land use)
- Urban planning and development (e.g., zoning, economic development, land use)
- Urbanization (e.g., growth, sprawl)
- Engineering/construction/surveying
- Assessments and taxation
- Real estate/property management
- Software development
- Telecommunications
- Transportation
- Utilities
- Anthropology/archaeology/cultural resource management
- Education: K-12
- Education: university/college
- Technical training (e.g., workshops, short courses)
- Emergency/disaster management
- Hazard insurance (e.g., crop, flood, fire)
- Humanitarian aid
- Public health
- Defense/national security
- Environmental regulation
- Law enforcement
- Other (please specify) _____

Q17

In addition to the primary application, in what other areas have you used Landsat imagery?

Please check all that apply.

- I do not use it in other areas.
- Agricultural forecasting
- Agricultural management/production/conservation
- Biodiversity conservation
- Climate science/change
- Coastal science/monitoring/management
- Ecological/ecosystem science/monitoring
- Fish and wildlife science/management
- Fire science/management
- Forest science/management
- Geology/glaciology

- Land use/land cover change
- Oil and gas/mineral exploration/extraction
- Range/grassland science/management
- Recreation management
- Water resources (e.g., watershed management, water rights, hydrology)
- Rural planning and development (e.g., zoning, economic development, land use)
- Urban planning and development (e.g., zoning, economic development, land use)
- Urbanization (e.g., growth, sprawl)
- Engineering/construction/surveying
- Assessments and taxation
- Real estate/property management
- Software development
- Telecommunications
- Transportation
- Utilities
- Anthropology/archaeology/cultural resource management
- Education: K-12
- Education: university/college
- Technical training (e.g., workshops, short courses)
- Emergency/disaster management
- Hazard insurance (e.g., crop, flood, fire)
- Humanitarian aid
- Public health
- Defense/national security
- Environmental regulation
- Law enforcement
- Other (please specify) _____

Questions 18-21 will help the USGS to ascertain the potential benefits of Landsat imagery to society. These questions are open-ended to gather the greatest variety of responses. Understanding the qualitative benefits of Landsat imagery will provide insight into its overall benefits. The USGS and other decision makers are interested in knowing about the current uses of Landsat and how the imagery is being incorporated in decision making and policy changes. USGS program officers need a comprehensive explanation of the societal benefits of satellite imagery, beyond the measurable and quantifiable economic benefits. We have chosen the following questions to target that goal. Responses from these questions will be analyzed and categorized in terms of content themes. In order to encourage brief responses and to minimize burden, the respondents will have a limited amount of space to answer these questions.

Q18

Considering your **primary** application area, please give us a brief description, including objectives, of **ONE** of your current projects that use Landsat imagery. (*Open-ended - limit 1500 characters*)

Q19

How have results from this project been used in decision-making? (*Open-ended - limit 1500 characters*)

Question 20 will help the USGS ascertain the benefits of Landsat imagery that are or have been provided by the projects conducted by the professional user community to the environment and/or society. The question asks specifically about the known benefits from their project and does not ask respondents to speculate on the potential benefits. The USGS needs information on the current benefits of satellite imagery in order to be able to increase those benefits, as directed by policy. Restricting the question by asking only about environmental benefits eliminates the possibility for respondents working in societal-focused application areas (i.e., urban planning, disaster response, humanitarian aid, national security) to relate the benefits to people from their projects.

Initially, for the PECORA survey review, this question was a fixed-response question. Feedback from the reviewers indicated that the fixed response format would not allow full exploration of the range of benefits of respondents' work that uses Landsat. Reviewers felt it was not possible to develop a comprehensive list of benefits for a fixed-response question because of the diversity of work being undertaken with Landsat imagery. An open-ended question will allow full exploration of the benefits of such work. Ultimately, only summaries of themes and categories of comments will be reported.

Q20

Please describe any benefits to the environment and/or society that you have observed from this project. (*Open-ended - limit 1500 characters*)

Question 21 allows the respondents to describe the uniqueness of Landsat imagery as compared to other moderate-resolution imagery and the niche that this imagery fills.

Q21

Why have you used Landsat imagery for this project, as opposed to other types of moderate-resolution imagery? (*Open-ended - limit 1500 characters*)

Question 22 will allow the USGS to know more about future uses of the imagery. This information is important to decision makers as they consider future missions of Landsat. For effective configuration and specifications of future missions, it is important to understand the potential new uses of the imagery. This question is open-ended because the new and unique uses of the imagery are unknown and cannot be listed in a multiple choice format.

Q22

New and unique uses for Landsat imagery continue to emerge as more people have access to the data and the means to manipulate it. What new or unique uses do you envision for Landsat imagery in the next 5 years? (*Open-ended - limit 1500 characters*)

Section 3: Importance of Moderate-Resolution Imagery in Your Work

This section explores the importance of and satisfaction with various attributes of imagery and types of imagery products. This information will help the USGS make decisions about future satellite missions as well as current provision of data.

Questions 23-25 explore the importance of and satisfaction with various attributes of moderate-resolution and Landsat imagery. The attributes are a mix of those that can be changed with relative ease (e.g., accessibility, cost, etc.) and those which cannot be changed easily (e.g., spatial, spectral, or temporal resolution). By determining the importance of and satisfaction with these attributes, the USGS can evaluate the need to make changes to current and future satellite missions in order to better serve the user community.

Please tell us about the importance of moderate-resolution imagery in your work. We would like to know about your satisfaction and perceptions regarding the benefits of using moderate-resolution imagery. Please answer the following questions in terms of your own projects, rather than those of your entire organization, unless otherwise requested.

Q23

When deciding which moderate-resolution imagery (e.g., Landsat TM, ASTER, AWiFS) to use for a project, how important are the following attributes? *Please select only one answer for each attribute.*

	<u>Very Unimportant</u>	<u>Somewhat Unimportant</u>	<u>Neither Important nor Unimportant</u>	<u>Somewhat Important</u>	<u>Very Important</u>
Accessibility	-2	-1	0	1	2
Archive/continuity	-2	-1	0	1	2
Area/footprint of an individual scene	-2	-1	0	1	2
Availability	-2	-1	0	1	2
Cost	-2	-1	0	1	2
Data quality assessments	-2	-1	0	1	2
Delivery time	-2	-1	0	1	2
Ease of use	-2	-1	0	1	2

Global coverage	-2	-1	0	1	2
Licensing/distribution restrictions	-2	-1	0	1	2
Spatial resolution	-2	-1	0	1	2
Spectral resolution	-2	-1	0	1	2
Temporal resolution/frequency of coverage	-2	-1	0	1	2

Q24

How important is Landsat imagery overall in your current work? *Please select only one.*

<u>Very Unimportant</u>	<u>Somewhat Unimportant</u>	Neither Important nor <u>Unimportant</u>	<u>Somewhat Important</u>	<u>Very Important</u>
-2	2	0	1	2

Q25

How satisfied are you with the following attributes of Landsat imagery as they exist today? *Please select one number for each attribute.*

	<u>Very Dissatisfied</u>	<u>Somewhat Dissatisfied</u>	<u>Neither Satisfied nor Dissatisfied</u>	<u>Somewhat Satisfied</u>	<u>Very Satisfied</u>	<u>Not Applicable</u>
Accessibility	-2	-1	0	1	2	NA
Archive/continuity	-2	-1	0	1	2	NA
Area/footprint of an individual scene	-2	-1	0	1	2	NA
Availability	-2	-1	0	1	2	NA
Cost	-2	-1	0	1	2	NA
Data quality assessments	-2	-1	0	1	2	NA
Delivery time	-2	-1	0	1	2	NA
Ease of use	-2	-1	0	1	2	NA
Global coverage	-2	-1	0	1	2	NA
Licensing/distribution restrictions	-2	-1	0	1	2	NA
Spatial resolution	-2	-1	0	1	2	NA
Spectral resolution	-2	-1	0	1	2	NA
Temporal resolution/frequency of coverage	-2	-1	0	1	2	NA

Question 26 determines the types of processing that are most important to users of moderate-resolution imagery. Understanding these preferences will aid in the creation of more useful products for the user community.

Q26

How important are the following types of moderate-resolution imagery to your work? *Please select only one answer for each type of imagery.*

	<u>Very Unimportant</u>	<u>Somewhat Unimportant</u>	<u>Neither Important nor Unimportant</u>	<u>Somewhat Important</u>	<u>Very Important</u>
Raw, unprocessed imagery	-2	-1	0	1	2
A basic, processed product that is calibrated, geo-referenced and orthorectified	-2	-1	0	1	2
A processed product that is calibrated, geo-referenced, orthorectified, and adjusted for surface reflectance	-2	-1	0	1	2
A derived product such as vegetation condition, change area, or land cover map	-2	-1	0	1	2

Section 4: Value of Landsat Imagery

The questions in this section ask about the value of Landsat imagery, including how your acquisitions of the imagery have changed over time and the costs and revenues (or funding) related to your work that uses the imagery.

Question 27 determines the number of Landsat scenes respondents are acquiring, as well as where they are acquiring scenes and how much they paid for them. This information will be used to identify where Landsat imagery is being acquired, changes in imagery acquisition, and costs now that the imagery is available at no cost from EROS. Understanding current and past imagery acquisition practices helps determine the imagery’s value to users. This information will be helpful to future management in providing imagery to users.

Q27

You may be aware that, as of the beginning of 2009, all Landsat imagery became available at no cost through the USGS Earth Resources Observation and Science (EROS) Center. Depending on where you obtain imagery, this change may have impacted your acquisitions. *Please answer the following questions about your acquisition of Landsat imagery, **before** and **after** it became available at no cost.*

	<u>January 1, 2008 to January 1, 2009</u>	<u>January 1, 2009 to Present</u>
A. Where did you acquire Landsat imagery in the time periods indicated? <i>Please check all that apply.</i>	<input type="checkbox"/> AmericaView <input type="checkbox"/> EROS <input type="checkbox"/> Global Land Cover Facility <input type="checkbox"/> Internet in general <input type="checkbox"/> Landsat.org <input type="checkbox"/> Landsat International Cooperators/ International Ground Stations <input type="checkbox"/> Other (please specify) _____ <input type="checkbox"/> Don't know	<input type="checkbox"/> AmericaView <input type="checkbox"/> EROS <input type="checkbox"/> Global Land Cover Facility <input type="checkbox"/> Internet in general <input type="checkbox"/> Landsat.org <input type="checkbox"/> Landsat International Cooperators/ International Ground Stations <input type="checkbox"/> Other (please specify) _____ <input type="checkbox"/> Don't know
B. Approximately, how many Landsat scenes have you acquired per month from all sources during each of the time periods indicated?	Number of scenes per month _____	Number of scenes per month _____
B1. How many of these scenes did you acquire from EROS?	Number of scenes per month _____	Number of scenes per month _____
C. Approximately how much have you spent on Landsat imagery per month in each of the time periods indicated?	Dollars per month _____	Dollars per month _____
C1. How much of this amount did you spend on imagery acquired from EROS?	Dollars per month _____	

Answers to Question 28 will be used to determine the importance of imagery for current work or projects. This will help us to describe the value of the information to users.

Q28

Please estimate the percent of your work that used Landsat imagery **in the past year**. *Please check only one.*

- 1% or less
- 5%
- 10%
- 20%
- 30%
- 40%
- 50%
- 60%
- 70%
- 80%
- 90%
- 100%

The following series of questions (29-47) are needed to measure the value of information that Landsat imagery provides to professional Landsat users. According to Macaulay (2006), measuring the value of information derived from earth science data requires information on: 1) what the outputs save; 2) what users would do without the outputs (i.e., how much more would it cost or how less effective results would be); and 3) what users are willing to pay to use the outputs. Questions 29-40 measure the first two pieces of information suggested by Macaulay (2006), that is, what Landsat imagery saves respondents and what they would do without the imagery. The third measure suggested by Macaulay (2006) requires that we ask what users are willing to pay to use the outputs (questions 41-47). The detailed cost questions are important in assisting the respondent in constructing total costs. Further, potential changes in value of information are different if the underlying costs are largely fixed versus largely variable.

Questions 29-47 are needed to measure the value that Landsat imagery provides to users. As explained in the Supporting Statement, the USGS is responsible for ensuring data continuity if a break in provision of Landsat imagery does occur. USGS will be required to immediately provide replacement imagery and must ensure the investment in supplying replacement imagery is equivalent to the value of the existing imagery. USGS must understand the user demand and preferences in order to select an effective and appropriate alternative imagery. The USGS must negotiate prices to acquire substitute imagery from other providers in the event of a gap in Landsat coverage. They must also know how many scenes users would purchase at alternative prices, and what would happen to the quantity of scenes demanded if USGS passed on the cost of purchasing substitute imagery.

Questions 41-47 measure users' willingness to pay (WTP) by use of a sequenced, double-

bounded, dichotomous-choice, series of willingness to pay questions. The rationale for these questions is that a user’s maximum WTP would be capped at the cost savings from using Landsat, or alternatively, WTP to avoid the cost increase without Landsat. This will reveal the demand curve for Landsat imagery.

Questions 29-40 identify how the user would be affected if Landsat imagery was no longer available, both in terms of the effects on their work and the preferred sources of replacement imagery. This information will help the USGS establish the appropriate range of replacement imagery necessary to ensure data continuity.

Q29

To better understand the value of Landsat imagery, the following questions explore the potential impact to your work **if new and archived Landsat imagery was no longer available**.

If Landsat imagery was no longer available, possible courses of action could include:

- discontinuing some or all of your work;
- substituting other imagery or information; or
- continuing work without substituting other imagery or information.

Of your work that now relies on Landsat imagery, what percentage would be **discontinued**, **substituted**, and/or **continue without substituting other imagery or information**?

<u>Discontinue work</u>	<u>Substitute other imagery or information</u>	<u>Continue work without substituting other imagery or information</u>
<input type="checkbox"/> 0% →Q34 (all answers)	<input type="checkbox"/> 0% →Q34	<input type="checkbox"/> 0% →Q34 (all answers)
<input type="checkbox"/> 1-5%	<input type="checkbox"/> 1-5%	<input type="checkbox"/> 1-5%
<input type="checkbox"/> 6-10%	<input type="checkbox"/> 6-10%	<input type="checkbox"/> 6-10%
<input type="checkbox"/> 11-20%	<input type="checkbox"/> 11-20%	<input type="checkbox"/> 11-20%
<input type="checkbox"/> 21-30%	<input type="checkbox"/> 21-30%	<input type="checkbox"/> 21-30%
<input type="checkbox"/> 31-40%	<input type="checkbox"/> 31-40%	<input type="checkbox"/> 31-40%
<input type="checkbox"/> 41-50%	<input type="checkbox"/> 41-50%	<input type="checkbox"/> 41-50%
<input type="checkbox"/> 51-60%	<input type="checkbox"/> 51-60%	<input type="checkbox"/> 51-60%
<input type="checkbox"/> 61-70%	<input type="checkbox"/> 61-70%	<input type="checkbox"/> 61-70%
<input type="checkbox"/> 71-80%	<input type="checkbox"/> 71-80%	<input type="checkbox"/> 71-80%
<input type="checkbox"/> 81-90%	<input type="checkbox"/> 81-90%	<input type="checkbox"/> 81-90%
<input type="checkbox"/> 91-99%	<input type="checkbox"/> 91-99%	<input type="checkbox"/> 91-99%
<input type="checkbox"/> 100%	<input type="checkbox"/> 100%	<input type="checkbox"/> 100%
<input type="checkbox"/> Don't know	<input type="checkbox"/> Don't know →Q34	<input type="checkbox"/> Don't know

Question 30 will only be answered by respondents who choose 1-100% under the “**Substitute**”

other imagery or information” action in Question 29.

Q30

Of your work that would use **other imagery or information as a substitute**, what percentage would use each of the following types of imagery or information? *Please select only one answer for each type of substitute imagery or information.*

<u>Different type of imagery</u>	<u>On-the-ground fieldwork</u>	<u>Other data sets (not including other imagery)</u>
<input type="checkbox"/> 0% →Q34	<input type="checkbox"/> 0% →Q34 (all answers)	<input type="checkbox"/> 0% →Q34 (all answers)
<input type="checkbox"/> 1-5%	<input type="checkbox"/> 1-5%	<input type="checkbox"/> 1-5%
<input type="checkbox"/> 6-10%	<input type="checkbox"/> 6-10%	<input type="checkbox"/> 6-10%
<input type="checkbox"/> 11-20%	<input type="checkbox"/> 11-20%	<input type="checkbox"/> 11-20%
<input type="checkbox"/> 21-30%	<input type="checkbox"/> 21-30%	<input type="checkbox"/> 21-30%
<input type="checkbox"/> 31-40%	<input type="checkbox"/> 31-40%	<input type="checkbox"/> 31-40%
<input type="checkbox"/> 41-50%	<input type="checkbox"/> 41-50%	<input type="checkbox"/> 41-50%
<input type="checkbox"/> 51-60%	<input type="checkbox"/> 51-60%	<input type="checkbox"/> 51-60%
<input type="checkbox"/> 61-70%	<input type="checkbox"/> 61-70%	<input type="checkbox"/> 61-70%
<input type="checkbox"/> 71-80%	<input type="checkbox"/> 71-80%	<input type="checkbox"/> 71-80%
<input type="checkbox"/> 81-90%	<input type="checkbox"/> 81-90%	<input type="checkbox"/> 81-90%
<input type="checkbox"/> 91-99%	<input type="checkbox"/> 91-99%	<input type="checkbox"/> 91-99%
<input type="checkbox"/> 100%	<input type="checkbox"/> 100%	<input type="checkbox"/> 100%
<input type="checkbox"/> Don't know →Q34	<input type="checkbox"/> Don't know	<input type="checkbox"/> Don't know

Questions 31-33 explore user preferences and demand for alternative imagery. This information will be used by the USGS to select appropriate replacement imagery in the event of a gap in Landsat imagery.

Q31

Which of the following moderate-resolution imagery would be your preferred substitute (regardless of budget constraints)? *Please select only one answer.*

- Terra (ASTER)
- CBERS (CCD)
- Resourcesat (IRS, LISS, AWiFS)
- SPOT (HRVIR, HRG, HRS)
- ALOS (AVNIR-2)
- Other (please specify) _____

Q32

Given your current budget constraints, which of the following moderate-resolution imagery would you be most likely to use as a substitute? *Please select only one answer.*

- Terra (ASTER)
- CBERS (CCD)
- Resourcesat (IRS, LISS, AWiFS)
- SPOT (HRVIR, HRG, HRS)
- ALOS (AVNIR-2)
- Other (please specify) _____

Q33

Approximately how many scenes of this imagery would you purchase annually to replace Landsat imagery? *Please enter the number of scenes.* _____

Questions 34 and 35 will identify the extent different types of user costs would be affected if Landsat imagery was no longer available. This information will be used by the USGS to understand the impacts on users in the event of a break in the provision of the imagery. USGS will consider these impacts and how to minimize them in selecting appropriate alternative imagery.

Q34

If Landsat imagery was no longer available, how likely is it that the following would occur? *Please select only one answer for each scenario.*

	<u>Highly unlikely</u>	<u>Somewhat unlikely</u>	<u>Neither likely nor unlikely</u>	<u>Somewhat likely</u>	<u>Highly likely</u>
My overall costs would increase.					
I would hire more staff.	1	2	3	4	5
I would purchase additional equipment and/or software.	1	2	3	4	5
I would incur additional processing costs for substitute data or other imagery.	1	2	3	4	5
The time my colleagues and/or I spend on a project would increase.	1	2	3	4	5
There would be additional administration and/or overhead costs.	1	2	3	4	5

Q35

If there are other costs that would increase if Landsat imagery was no longer available, please list them here. (*Open-ended – limit 250 characters*)

Questions 36 and 37 will be used to verify the minimum value of the imagery to users estimated from the WTP responses by analyzing the current costs associated with the imagery in conjunction with the percent increase in costs. This will be included as a variable to measure the size of the company in the CVM dichotomous choice logit model.

Q36

If new and archived Landsat imagery was **no longer available**, what would be the total percent increase in costs for your work that relies on Landsat imagery? *Please select only one answer.*

- 0% → Q41
- 1-5%
- 6-10%
- 11-20%
- 21-30%
- 31-40%
- 41-50%
- 51-60%
- 61-70%
- 71-80%
- 81-90%
- 91-99%
- 100% or more
- Don't know → Q41

Q37

What is the current total dollar amount upon which your percentage increase in costs is based? *Please enter a dollar amount. \$_____*

Questions 38-40 provide unique information as to the value-added and services provided by the imagery user. An important problem with valuing information is its public good characteristic of non-excludability. Images, once purchased for a specific cost, can be value-added and sold to multiple users. This value-added component is an important part of the value of information which is in addition to the cost of information and may be substantial.

Q38

How would your revenue or funding for work which now relies on Landsat imagery be impacted, if the imagery was no longer available? *Please select only one answer.*

- Revenue or funding would increase.
- Revenue or funding would decrease.
- Revenue or funding would neither increase nor decrease. → Q41

Don't know → Q41

Q39

By what percent would your revenue or funding increase [decrease]? *Please select only one answer.*

- 1-5%
- 6-10%
- 11-20%
- 21-30%
- 31-40%
- 41-50%
- 51-60%
- 61-70%
- 71-80%
- 81-90%
- 91-99%
- 100% or more

Q40

What is the current total dollar amount upon which your percentage increase [decrease] in revenue or funding is based? *Please enter a dollar amount.* \$_____

Questions 41-47 measure the third component of the value of information as described by Macaulay (2006): What are users willing to pay for Landsat imagery? One of the primary purposes of this survey is to determine the value of Landsat imagery; therefore, information about respondents' willingness to pay for imagery is essential.

Questions 41 and 44 are sequenced, double-bounded, dichotomous-choice, willingness to pay (WTP) questions. Such questions capitalize on the strengths of the binary dichotomous choice format by requiring only a market-like "Yes" or "No" response, yet greatly improve the precision and statistical efficiency of the WTP estimates. Asking the respondent the follow-up WTP question conditional to their answer to the first dichotomous choice question allows for bracketing of the respondents WTP between the two dollar amounts. Thus a "Yes" response to \$X and a "No" response to \$Y (where $\$X < \Y), brackets a respondent's WTP between \$X and \$Y. Likewise a "No" response to \$X followed by a "Yes" response to \$Z (where $\$X > \Z) brackets a respondent's WTP between \$X and \$Z. The "\$XXX" in Q41 will be replaced with the different bid amounts of which each respondent will randomly be given one amount (\$5, \$10, \$20, \$30, \$40, \$50, 60\$, \$70, \$80, \$100, \$150, \$200, \$250, \$300, \$400, \$500, \$700, \$1,200, \$1,500, \$2,500, or \$5,000). These amounts are based off the real world prices of substitute imagery and were decided upon in conjunction with Dr. John Loomis of Colorado State University. Currently, the prices for one scene of other moderate-resolution imagery range from zero (CBERS imagery) to around \$4,000 (Resourcesat imagery). However, many sensors produce a smaller scene than a Landsat scene, meaning that more than one scene would be required to replace a single Landsat scene. After taking into account how many replacement

scenes would be needed for each type of imagery, the highest cost rises to more than \$12,000 (SPOT imagery). However, it would be corporations, not individual users that would be investing in these multiple scenes at the higher end of the cost scale. The range of prices for individual scenes (\$0-\$4,000) best represents the range of substitutes to individual users. Placing the highest bid amount at \$5,000 will capture the full demand curve of our target audience (users).

Question 42 measures respondents' uncertainty in regard to their willingness to pay responses; this allows for the incorporation of this factor in the statistical analysis. The literature has shown that incorporating respondent uncertainty can increase the goodness of fit and decrease the standard error in willingness to pay models. The linear certainty scale is the same scale used in Champ et al (1997) and Ekstrand and Loomis (1998). This numerical scale is required for the statistical analysis. The uncertainty scale will allow us to calibrate the stated WTP to better match what cash validity studies show as WTP. In particular, by coding only "Yes" responses with a certainty of 70%, 80%, 90%, or 100%, and recoding the less certain "Yes" responses to "No" responses, there is evidence that the resulting WTP better matches cash validity WTP (Ethier et al, 2000).

Questions 43 and 45 are follow-up questions to determine how many images would be purchased at the given bid amount in order to calculate the total amount each respondent would be willing to pay.

Question 46 is a follow-up for respondents that reply "No" to Question 44. The purpose of this question (and the follow-up Q47) is to check for protest responses from individuals who would say no regardless how low the bid amount is.

Q41

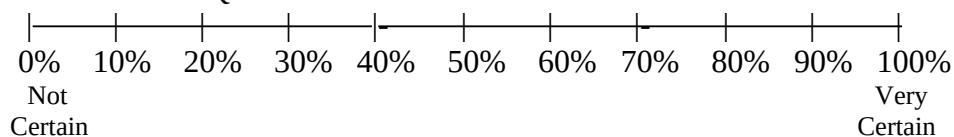
If Landsat 5 and 7 became inoperable before Landsat 8 is operational (scheduled to launch in 2012), Landsat imagery users might have to obtain imagery elsewhere during the interim. Assume that you are restricted to your current budget level and that the money to pay this cost would have to come out of your existing fiscal year budget.

If such a break in continuity did occur and you had to pay for imagery that was equivalent to the Landsat standard product now available, would you pay \$XXX for one scene covering the area equivalent to a Landsat scene?

- Yes
- No

Q42

How certain are you that you would [would not] pay \$XXX (same as Q41) for the imagery?
Please select the percentage that best represents your answer. → Q43 if answered "Yes" to Q41
OR Q44 if answered "No" to Q48



Q43

Approximately how many scenes would you buy per month if each scene cost \$XXX (same as Q48)? (Open-ended – limit 10 characters)

The cost in Question 44 will be determined by the initial amount stated in Q41 and the respondent's answer to Q41. If the respondent answers "Yes" to Q41, the amount in Q44 will be **double** the amount in Q41 (i.e., \$500 in Q41 would result in \$1,000 in Q44). If the respondent answers "No" to Q41, the amount in Q44 will be **half** the amount in Q41 (i.e., \$500 in Q41 would result in \$250 in Q44).

Q44

If the cost was \$XXX, would you pay this amount for one scene covering the area equivalent to a Landsat scene?

- Yes
- No → Q46

Q45

Approximately how many scenes would you buy per month if each scene cost \$XXX (same amount as Q44)? (Open-ended – limit 10 characters) → Q48

Q46

If the cost was \$1, would you pay this amount for one scene covering the area equivalent to a Landsat scene?

- Yes → Q48
- No

Q47

Please tell us why you would not pay \$1 for the imagery. (Open-ended - limit 1500 characters)

Section 5: A Little Bit About Yourself

Questions 48-58 are demographics questions. We need this information to provide a detailed picture of the moderate-resolution imagery user community. Additionally, in the case that another survey is conducted on this topic in the next few years, this information will be necessary to determine how the user community may have changed. Because Landsat imagery is now available at no cost (as of January 31, 2009), it is now accessible to a wider variety of users. We would like establish a set of baseline data that can be used to characterize the changes in the user demographics after January 31, 2009.

Please tell us a little bit about yourself. Your answers to these questions will help further characterize users of moderate-resolution imagery. Answers are in no way linked to any individual taking this survey.

Q48

In what sector do you work? *Please check all that apply.*

- Academic institution (e.g., university, college, technical/vocational)
- Federal government
- State government
- Local government (e.g., county, municipal)
- Private business
- Non-profit organization
- Tribe or nation
- Other (please specify) _____

Q49

Are you...?

- Male
- Female

Q50

In what year were you born?

Questions 51 and 52 will provide information on underrepresented users of moderate-resolution imagery. Decision makers would like to know the extent to which use has expanded to traditionally underrepresented groups.

Q51

What ethnicity do you consider yourself? *Please check only one.*

- Hispanic or Latino
- Not Hispanic or Latino

Q52

From what racial origin(s) do you consider yourself? *Please check all that apply.*

- American Indian or Alaska Native
- White
- Black or African American
- Asian
- Native Hawaiian or Other Pacific Islander

Q53

What is your highest level of formal schooling? *Please check only one.*

- Junior high or middle school

- Some high school
- High school diploma or GED
- Some college
- Associates degree
- Bachelors degree
- Some graduate school
- Masters degree
- Doctorate degree

Questions 54 and 55 will allow the USGS to determine the extent to which respondents are professionally trained and involved in the user community. Again, with the advent of Landsat imagery available at no cost, the user community may be changing to include people who have different professional backgrounds and baseline data needs to be established to determine if such changes are occurring.

Q54

What type(s) of education or training (e.g., university degrees, technical certificates) have you received related to remote sensing or GIS? *(Open-ended - limit 500 characters)*

Q55

To which of the following remote sensing/GIS-related organizations do you belong? *Please check all that apply.*

- I am not a member of any remote sensing/GIS-related organizations.
- American Association for Geodetic Surveying (AAGS)
- American Congress of Surveying and Mapping (ACSM)
- American Society of Photogrammetry and Remote Sensing (ASPRS)
- Association of American Geographers (AAG)
- Cartography and Geographic Information Society (CAGIS)
- Consortium for International Earth Science Information Network (CIESIN)
- Geographic and Land Information Society (GLIS)
- National Society of Professional Surveyors (NSPS)
- National States Geographic Information Council (NSGIC)
- University Consortium for Geographic Information Science (UCGIS)
- Urban and Regional Information System Agencies (URISA)
- Other (please specify) _____

Q56

Did you **personally** download any Landsat scenes from **EROS** since it became available at no cost (in 2009)? *Please check only one.*

- Yes

- No
- Don't know

Question 57 allows respondents to express any additional thoughts or concerns about the issues raised in the survey. The responses will be analyzed to determine any unforeseen issues or problems with Landsat imagery that the USGS may choose to address.

Q57

Thank you for completing this survey. If you have any additional thoughts or concerns about the issues raised in the survey, please enter your remarks in the space below. (*Open-ended - limit 1500 characters*)