Fort Collins Science Center

Evaluation of the National Gap Analysis Program (GAP): A Survey of Users of GAP Data—Report to Respondents

By Joan M. Ratz

Open-File Report 2014–1166

U.S. Department of the Interior
U.S. Geological Survey

U.S. Department of the Interior
SALLY JEWELL, Secretary

U.S. Geological Survey
Suzette M. Kimball, Acting Director

U.S. Geological Survey, Reston, Virginia: 2014

For more information on the USGS—the Federal source for science about the Earth, its natural and living resources, natural hazards, and the environment—visit *http://www.usgs.gov* or call 1–888–ASK–USGS

For an overview of USGS information products, including maps, imagery, and publications, visit *http://www.usgs.gov/pubprod*

To order this and other USGS information products, visit *http://store.usgs.gov*

Suggested citation:
Ratz, J.M., 2014, Evaluation of the National Gap Analysis Program (GAP)—A survey of users of GAP data—Report to respondents: U.S. Geological Survey Open-File Report 2014–1166, 94 p., *http://dx.doi.org/10.3133/ofr20141166*.

ISSN 2331-1258 (online)

Contents

Executive Summary 1
Purpose of this Report 2
Purpose of the Survey 2
Conducting the Survey 3
  Identifying the Sample 3
  Administering the Survey 3
  Response Rate 4
Preliminary Findings 4
Question Summaries 8
  Introductory Questions 8
  How GAP Data Have Been Used 10
  Characteristics of Survey Respondents 11
  Acquisition of GAP Data 17
  GAP Datasets—Geographic Sets of Data 20
    Questions about Regional Datasets 22
    Questions about State Datasets 22
    Questions about National Datasets 23
  GAP Datasets—Types of Data 23
    Land-Cover Data 28
    Predicted Species Distribution Data 38
    Stewardship/Protected Areas Data 45
    Analysis Data 49
  Benefits of Using GAP Data 50
  GIS Software and Data Preferences 56
  Learning to Use GAP Data 60
  Distribution of GAP Data and Products Based on GAP Data 63
  Opinions of Possible Future Actions 68
  Outreach Methods 70
  Reputation of GAP 76
  Goals and Objective of GAP 79
  General Comment 83
Nonresponse Survey 87
Limitations to Report 94
Acknowlegments 94
Reference Cited 94

Evaluation of the National Gap Analysis Program (GAP): A Survey of Users of GAP Data—Report to Respondents

By Joan M. Ratz

Executive Summary

This report provides a summary of responses to the questions included in a survey of individuals who use or have used data created and provided by the U.S. Geological Survey (USGS) National Gap Analysis Program (GAP). The survey was commissioned by the GAP main office and was conducted by USGS personnel in the Policy Analysis and Science Assistance (PASA) branch. The data collection process started on September 18, 2012, and ended on November 9, 2012. The dataset includes the responses from 359 individuals. The adjusted response rate for the survey was 35 percent. This report provides a summary of results for the survey questions in the order in which the questions were asked. The text of comments provided by respondents to open-ended questions is provided.

Because the response rate was lower than 80 percent, the Office of Management and Budget (OMB) required a nonresponse survey of those who did not respond to the first survey. The nonresponse survey was very brief and included primarily demographic questions. All individuals who were sent the original survey and who did not respond or declined to respond to that survey were sent the nonresponse survey. The nonresponse survey was conducted from January 11, 2013, to January 24, 2013. The responses to the questions on the nonresponse survey are included in this report.

The preliminary conclusions are based only on frequencies and averages of responses to the survey questions. Most respondents to the survey are currently using or have used GAP data within the last 5 years. When asked which geographic set of data they were familiar with, the most frequent response was state data. When asked which type of GAP data they were familiar with, respondents most frequently indicated that they were most familiar with land-cover data.

The respondents were asked only questions that pertained to the type of data with which they were most familiar. The respondents who answered questions about land-cover data were generally positive in their opinions. The respondents indicated that the land-cover data should be updated every 5 to 7 years. They rated land-cover data as medium quality and indicated that the data met most of the users' expectations. Respondents indicated that there are alternative data sources to GAP land-cover data.

The respondents who answered questions about predicted species distribution data were generally positive in their opinions. They rated predicted species distribution data as medium quality and indicated that the data met most of the users' expectations. When asked how frequently the predicted species distribution data should be produced, respondents were split, choosing the intervals of 5 to 7 years and 8 to 10 years with equal frequency. Fifty-eight percent of respondents answering the predicted species questions indicated that there were no alternatives to GAP predicted species distribution data.

The respondents who answered questions about stewardship data were generally positive in their opinions of the GAP data. GAP stewardship data were viewed as being high quality and meeting most of users' expectations. Respondents indicated there are alternative sources of data to GAP stewardship data.

The respondents who answered questions about analysis data were generally positive in their opinions of the GAP data. Respondents indicated there are alternative sources of data to GAP analysis data.

Respondents to the survey indicated they intend to continue using GAP data and will use future releases of GAP data. They indicated there were multiple benefits to using GAP data.

Several sections of the survey addressed methods by which GAP could promote the use of GAP data. When asked about training sessions on how to use GAP data, respondents indicated that such training would be only somewhat helpful and that they would not be willing to pay more than a negligible amount. Respondents indicated that it was generally unlikely that they would submit a presentation to or attend a GAP conference. Most frequently respondents indicated they have never used information from the "GAP Bulletin" and that they were not familiar with the publication. Most survey respondents had visited the GAP web site at some time. They visited the web site primarily to obtain information or download data and indicated that the web site visit met some or all of their needs.

GAP was perceived as having a generally positive reputation but one that might be limited in scope. When asked what percentage of people who could use GAP data know about GAP, respondents most frequently selected the response option "Between 26 and 50%."

The survey ended with an open-ended question asking respondents for other comments about GAP data. Respondents were provided with an opportunity to add their email address to a mailing list for GAP.

Purpose of this Report

This is a report to survey respondents. The intent of this report is to provide those who responded to the survey with feedback regarding the responses to the survey questions. This report includes brief descriptions of the purpose of the survey and of the procedure followed to conduct the survey. The survey results in this report include the response rate to the survey and descriptive results for each survey question. The survey questions are listed in the order in which they appeared on the survey. The frequencies with which the response options were chosen by survey respondents are provided. When appropriate for the question type, the average of the responses is provided. It would be inappropriate to draw conclusions or make recommendations based upon the level of analyses included in this report.

Purpose of the Survey

GAP periodically evaluates its program performance regarding the use of its data and science. The Policy Analysis and Science Assistance (PASA) branch at the USGS Fort Collins Science Center was asked to conduct an evaluation of GAP. The aim of the evaluation included three objectives—

- to characterize users of GAP data and products;
- to identify how those products have been used; and
- to estimate GAP's contribution, whether direct or indirect, to conservation of biodiversity.

The most direct method to evaluate the use of GAP data is to survey individuals who use GAP data now or have used the data in the past.

Conducting the Survey

Identifying the Sample

Identifying the sample for this survey was time consuming and required multiple approaches. The data produced by GAP are available to the public at no cost. GAP does not require the individuals who download data to provide any identifying information nor does GAP maintain customer lists. For these reasons, the identification of GAP data users for the purposes of conducting a survey presented a challenge.

Some GAP users are known to GAP, but there are unknown users of GAP data whose perspective should be included in a thorough evaluation of GAP. Two approaches were used to identify GAP data users. A "snowball sampling" approach was used to identify GAP data users. This approach is typically used to identify research subjects from hidden populations. Because there are no existing comprehensive lists of GAP users, this population was considered a hidden population. As another part of the evaluation of GAP, a review of published literature that cited GAP data was conducted (Ratz and Conk, 2014). The authors identified as having used GAP data were added to the list of GAP users.

The snowball sampling approach was started by creating a GAP user database that included authors who published articles in volumes 1 to 14 of the "GAP Bulletin." Names of potential users were solicited from the offices that develop state and regional GAP data. The names they provided were added to the GAP user database. The lists included subscribers to the "GAP Bulletin," names from individuals participating in a study of State Wildlife Action Plans, and names of individuals who had downloaded GAP data from a site maintained by a state or a university offering state level GAP data. The database included the name and email address for each individual.

Each individual in the database was emailed a message alerting them to the upcoming survey and asking if they could provide the names and email addresses of three other individuals who they knew to be users of GAP data. When a name was received that was not already in the database, the name was added, and an email was sent to that person asking if he or she could provide the names and email addresses of three other individuals who were users of GAP data. This process was followed until the number of new names received declined sharply.

Administering the Survey

The variety of GAP products available (state, regional, or national; land cover, predicted species distributions, stewardship, or analysis), the importance of the information addressed in the survey, and the varied nature of identified GAP users were compelling reasons to send the survey to the complete list of 1,264 identified GAP users rather than sampling from the list.

A message written by Dr. Kevin Gergely, National GAP Program Manager, introducing the survey was emailed to the individuals included in the survey. Although the message was from Dr. Gergely, it was sent by PASA personnel to maintain the privacy and protect the identity of those participating in the survey. After this introductory letter was sent, Joan Ratz, USGS Volunteer Social Scientist, sent an email message that included the link to the survey. This message was sent using KeySurvey software. KeySurvey automatically sent reminders to individuals who had not completed the survey 7 and 10 days after the survey opened. The data collection process started on September 18, 2012, and ended on November 9, 2012.

The survey was conducted entirely online. The survey was adaptive so that the number of total questions asked of respondents would be limited. Specifically, the parts of the survey that addressed certain types of GAP data solicited responses only from individuals who have knowledge of those types

of data. For example, the questions regarding land-cover data were directed only to respondents who indicated that they were most familiar with the land-cover data provided by GAP.

Response Rate

Of the 1,264 surveys initially sent, 215 were undeliverable due to invalid email addresses. Fifteen individuals requested to be removed from the survey sample. Six individuals were out of the office for the duration of the data collection process. This left a potential sample size of 1,028. Three hundred fifty-nine respondents answered the survey questions. The adjusted response rate was 35 percent.

Because the survey sample included individuals who were not Federal employees, the survey had to be submitted to the information collection request process overseen by the Office of Management and Budget (OMB). OMB requires that any survey with a response rate less than 80 percent must have a nonresponse bias survey. A nonresponse survey was conducted as part of this survey process. The results of the nonresponse survey are described in this report in a separate section "Nonresponse Survey" that follows the question summaries of the survey.

Preliminary Findings

This report includes only summaries of the responses to the questions asked on the survey. Until additional analyses are complete, only preliminary conclusions reached on the basis of these summary statistics can be presented.

Answers to the introductory questions indicate that most survey respondents use GAP data currently or have used GAP data within the last 5 years (2007–12). For those who are not now nor within the last 5 years users of GAP data, the primary reason they do not use GAP data is that it is not applicable to their current work.

Respondents who used GAP data within the last 5 years most frequently used the data to address the issues of biodiversity conservation and fish and wildlife management. They have used GAP data to provide information regarding conservation related policy issues and to provide decisionmakers with knowledge.

Survey respondents were from a variety of organizations; most users were from State and Federal agencies. Respondents indicated that conservation of biodiversity was important to their organizations. When asked to describe their current position, geographic information systems (GIS), ecology, fish and wildlife management, and conservation were the most frequently selected options. Respondents were asked to name a source they read most frequently to keep current in their field. The most frequently named publications were the "Journal of Wildlife Management" and "Conservation Biology."

The survey respondents were primarily skilled users of GIS, and most of them have been using GIS for more than 10 years. They learned GIS by themselves, through a graduate course, or through informal on the job training. They mostly use data to create information products but acquire, create, maintain, and distribute datasets. The opinion of many respondents was that only basic GIS skills are needed to use GAP data, although some respondents thought that high skill levels were needed.

Approximately one-third of respondents were partners in a state GAP project; otherwise, respondents often learned about GAP from someone else. They received GAP data either from a download from the GAP web site or through direct distribution from GAP.

Respondents were asked with which set of geographic data they were most familiar. Seventy percent of respondents were most familiar with state data, 20 percent of respondents were most familiar

with regional data, and only 10 percent were mainly familiar with national data. Those who use state data do so because the state data meet their needs more closely than regional data, but state data are not necessarily perceived as being more accurate. Those who use regional data do so because regional data meet their needs more closely than state data, but regional data are not necessarily perceived as being more accurate or current than state data. Those who use national data do so because they need data consistent at a national scale.

Most survey respondents agreed that the data they needed for their area were available. Forty percent used data that are approximately state sized in extent.

In terms of the types of data used, 57 percent of the respondents were most familiar with GAP land-cover data. These respondents were asked questions regarding land-cover data. Respondents indicated GAP land-cover data were useful at state, regional, ecosystem, and county levels. They indicated that GAP land-cover data were necessary at state, regional, ecosystem, county, and national levels. Having consistent seamless national coverage of vegetation was very important to respondents. When asked how frequently GAP land-cover data should be produced, the most frequently selected time period was 5 to 7 years. Opinions about land-cover data were generally positive. Respondents to the land-cover questions indicated the GAP land-cover data were of medium quality and that the data met most of the users' expectations. There are alternative sources to GAP land-cover data, and survey respondents named a variety of alternatives, such as state data, National Land Cover Data (NLCD), and LANDFIRE. Respondents gave GAP a grade of "B" for performance on mapping the land cover of the United States.

About 22 percent of survey respondents indicated they were most familiar with predicted species distribution (PSD) data. These respondents were asked more specific questions about PSD data. These respondents indicated that GAP data were useful at state, regional, and ecosystem levels and that GAP data are necessary at those levels as well as at national and county levels. It is important to respondents to have consistent seamless national coverage of PSD data. When asked how frequently they thought GAP PSD data should be produced, respondents were split between the response options of "5 to 7 years" and "8 to 10 years." Respondents agreed that it is more useful for species to be modeled on biological range rather than along state boundaries. Respondents agreed that the species modeled by GAP are appropriate for their uses. In general, respondents' opinions about GAP PSD data were favorable. Respondents to the PSD questions indicated the GAP PSD data were of medium quality and the data met most of the users' expectations. When asked if there were alternative sources to GAP PSD data, 58 percent of respondents to that question indicated there were no alternative sources. Respondents gave GAP a grade of "B" for performance on mapping PSD of vertebrate species for the United States. However, a nearly equal percentage indicated they lacked sufficient information to provide a grade.

Ten percent of respondents indicated they were most familiar with the stewardship data and were asked specific questions about that type of data. Respondents indicated GAP stewardship data were useful at the state, national, regional, and ecosystem levels, and GAP stewardship data are needed at the state, national, regional, ecosystem, and county levels. It is important to respondents to have consistent seamless national coverage of stewardship data. In the opinion of these respondents, GAP stewardship data should be updated every 2 to 4 years if not more frequently. Respondents who answered the stewardship questions were generally positive in their opinions of GAP stewardship data. However, when asked if GAP stewardship data were the best available data of that type, 41 percent were neutral, and there was no majority either in agreement or disagreement. GAP stewardship data are viewed as being high quality and meet most of the users' expectations. However, 41 percent of respondents indicated they did not have enough information to grade GAP's performance on documenting land ownership and protection in the United States. When asked if there were alternative sources for the

information provided in GAP stewardship data, 75 percent of respondents indicated there were alternatives.

When asked to identify with which type of GAP data they were most familiar, 11 percent of respondents indicated familiarity with analysis data. These respondents were asked a few questions specific to GAP analysis data. Respondents' opinions of analysis data were generally positive. When asked if there were alternative sources to GAP analysis data, 63 percent of these respondents indicated there were alternative sources.

After answering questions specific to the types of GAP data they use, respondents were asked about benefits of the use of GAP data. Respondents generally agreed that they intend to continue to use GAP data and that GAP data are compatible with other data they use. Respondents indicated that GAP data improve their capacity to affect conservation of biodiversity and help their organization achieve conservation-related goals. Their organizations experienced time savings, efficiency in the work process, improved effectiveness, and improved decisions. If GAP data were no longer available, respondents generally agreed that the work of their organization would suffer and that they would have to search for an acceptable replacement dataset. Respondents could not indicate how much a replacement would cost because there is no readily available substitute. Respondents indicated their work products would be less effective if they had to use alternate data instead of GAP.

A section of the survey included questions about respondents' GIS software and data preferences. The most frequently used GIS software package was ArcGIS. Respondents reported that they also have access to multiple other GIS software packages such as Imagine, ArcView, and ENVI. Respondents indicated a preference for downloading data rather than accessing web-based tools. They prefer direct download options. When downloading GIS raster data, whether GAP data or other data, respondents most frequently use ESRI GRID (Interchange format).

Respondents indicated that using GAP data for the first time was neither difficult nor easy. If they had a question about using GAP data, they would most likely go to the GAP web site to find information.

When asked questions regarding training on the use of GAP data, more than one-half of the respondents indicated it would be somewhat valuable with an average of 2 on a 4-point scale. Respondents would not be willing to pay more than a negligible amount for training. If respondents were to attend training they would want it to be for only one day. Respondents believed that the most effective form of training would be in an instructor-led classroom but that the most practical form of training would be web based.

When asked about contact with GAP staff, respondents most frequently indicated that they have not had contact with staff. Respondents were asked how they learned to use GAP data. The most frequent response was that they had figured it out by themselves and that it was somewhat easy to do.

A series of questions addressed the linkages between GAP and GAP users. Most frequently, respondents indicated that they knew someone involved in developing regional or state GAP projects but that they did not know anyone currently employed by GAP.

A section of survey questions addressed how GAP data are distributed. Respondents indicated that they generally do not distribute GAP data in the original form. When asked if they ever direct anyone to the GAP web site to download data, respondents were roughly split between those who never do and those who do so several times a year.

When asked how frequently they distribute a product based on GAP data, respondents most frequently indicated they do so up to several times a year. However, the distribution is usually limited to a few people. The intended audience for these products is usually at the state level.

The respondents to this survey indicated their role is primarily to provide information products to those who make policies and decisions affecting conservation and that they were most frequently not in a position to make decisions directly affecting conservation of biodiversity.

Respondents were asked several questions regarding possible future actions by GAP. Respondents indicated that land cover is the most important database to keep current and that it is more important to update existing data than to create new data. Respondents generally agreed they would use new releases of GAP data. Having access to an individual to help with use of GAP data was viewed by respondents as being somewhat useful.

A section of the survey addressed outreach methods and included questions regarding a GAP conference, the "GAP Bulletin," and the GAP web site. Respondents indicated that cost, location, and topics covered would affect their attendance at a GAP conference. Respondents indicated it was generally unlikely that they would submit a presentation to, or attend, a GAP conference.

Most frequently respondents indicated they had never used information from the "GAP Bulletin" and that they were not familiar with the publication. The respondents who had used the "GAP Bulletin" indicated that the information had been somewhat useful and that the bulletin was a good quality information source.

Most survey respondents had visited the GAP web site at some time. They visited the web site primarily to obtain information or download data. They believed that visiting the web site met some or all of their needs.

A section of the survey included questions about GAP's reputation. Respondents generally disagreed that GAP is unknown to conservation professionals and the GIS user communities. GAP is perceived as having a generally positive reputation. However, when asked if GAP is losing ground to competing organizations, more than 50 percent of the respondents would neither agree nor disagree. When asked about the breadth of GAP's reputation, respondents believed that GAP has a state-level reputation but were less confident in judging GAP's reputation at the national or county/municipal levels. Respondents were asked what percentage of people who could use GAP data know about GAP. The most frequently selected response option was "Between 26 and 50 percent."

Respondents indicated they would recommend use of GAP data to others, and many of them already have. Those who have not recommended GAP to others indicated that the main reason was that no opportunity to do so had occurred.

The last section of the survey included questions regarding the goals and objectives of GAP. The respondents indicated that the most appropriate use for GAP data is to provide decisionmakers with knowledge about conservation issues and indicated that GAP data were most frequently used in that way.

Respondents were asked how helpful GAP data are or could be in addressing 21 different issues. The results varied on the basis of the issue. For seven of the issues, respondents most frequently indicated that they could not judge how helpful GAP data would be in addressing that issue.

Respondents generally agreed that GAP data are relevant to pending decisions relating to conservation of biodiversity and are compatible with existing policy-making processes. Respondents generally agreed that individuals who make decisions about conservation of biodiversity would be open to considering the types of information products that can be made using GAP data.

When asked to rate GAP's progress in meeting its objectives or grade GAP's performance on meeting cooperation and information dissemination goals, most frequently respondents indicated that they lacked the knowledge to make such judgments.

The nonresponse survey included a small set of questions from the primary survey and was sent to those who did not respond when the primary survey data were collected. The purpose of a

nonresponse survey is to determine whether there are differences between those who responded to a survey and those who did not. Nearly one-half of those who answered the nonresponse survey are currently using GAP data or have used GAP data within the last 5 years. For those who are not currently using GAP data, the primary reason is because the data are not applicable to their current work. The respondents were most frequently employed by Federal agencies or universities. Respondents most frequently selected the term "ecology" to describe their current position. Most of these respondents were most familiar with data from state GAP projects. The type of data with which they were most familiar was land cover.

Question Summaries

The descriptive results for the survey questions are provided in the order in which the questions were asked. Because this was an adaptive survey, not all questions were asked of all respondents. Because some respondents skipped questions or did not complete the survey, the number of respondents (*n*) who answered the question is provided. The percentage of respondents that selected each response option is provided. Percentages are rounded to whole numbers and therefore may not always add to 100. There are a few instances in which so few individuals selected a particular response that the percentages rounded down to zero. In those few situations, "<0.5%" (less than 0.5 percent) is used to indicate that the response was selected by at least one respondent. If a response option is blank, no respondents selected that option. The responses selected most frequently are in bold type. Averages are provided when appropriate and are rounded to whole numbers.

The text of comments written by respondents for open-ended response questions is provided. When the open-ended responses were identical, the text of the response is provided and followed by a number in parentheses indicating the number of identical responses. To facilitate the ease of reading the comments, comments are grouped together into themes based on the content of the comment, when possible.

Introductory Questions

The first section of questions characterized the respondents' use of GAP data. The introductory questions were asked because knowing the respondents' level of use is critical to (1) accurately characterize the survey respondents and interpret their responses within the appropriate context and (2) direct respondents to appropriate questions later in the survey.

Q1 Which statement best describes your use of GAP data? (*n* = 359)

Response	Percent
a. I am using GAP data (either state, regional, or national data) at the present time, or have used it within the last five (5) years. (Respondents selecting this response were directed to Q11 next.)	**64**
b. I last used GAP data (either state, or regional) more than five (5) years ago. (Respondents selecting this response were directed to Q2 next.)	17
c. I am familiar with GAP data but have not used it. (Respondents selecting this response were directed to Q2 next.)	15
d. I am not familiar with GAP and believe I have received this survey in error. (Respondents selecting this response were directed to Q13 next.)	3

Q2 Which of the following is the most significant reason that you do not currently use GAP data? (*n* = 106)

Respondents selecting options a, b, or c to Q2 were next asked Q11 or Q13, depending on their answer to Q1. If they selected option b for Q1, they were asked Q11 next; if they selected option c for Q1, they were asked Q13.

The respondents who selected options d through k for Q2 were asked a follow-up question specific to each option. These questions were designed to provide GAP with information about the concerns the users have with GAP data. This information will help GAP understand why past users and potential users of GAP data do not currently use GAP data. Although the follow-up questions were numbered Q3 through Q10, the responses to these questions are provided immediately after the corresponding response to Q2. Q3 through Q10 have open-ended responses. The comments are provided in their entirety. The alterations made to the comments include correction of spelling and grammar and removal of identifying information, when necessary, but capitalization and punctuation were not standardized.

The last three responses to Q2 did not have follow-up questions associated with them. As with options a through c for this question, respondents selecting options l, m, or n to Q2 were next asked Q11 or Q13, depending on their answer to Q1.

Response	Percent
a. GAP data are not available for my area.	4
b. GAP data are not applicable to the work I'm currently doing.	**53**
c. GAP data are outdated.	8
d. I have concerns about the content of the land-cover data.	2
Q3: My main concern about the content of the land-cover data is (*n* = 4):	
The broad categories and difficulty of distinguishing wetland types and early successional types	
My job no longer places me in a positon to be a judge of data quality. GAP data has been valuable to us in the past, but my familiarity with it is not what it once was. I'd refer you to others within our organization to give you a better perspective on its utility.	
I have no concerns about GAP data. I am a database administrator...but am not an end user of the data.	
Accuracy at smaller scales.	
e. I have concerns about the quality of the land-cover data.	6
Q4: My main concern about the quality of the land-cover data is (*n* = 3):	
The GAP data I've seen have issues of class accuracy.	
Not at an acceptable accuracy level for even statewide use.	
I am not aware of a quality land cover dataset for Texas coming out of the GAP program.	
f. I have concerns about the content of the predicted species distribution data.	
Q5: My main concern about the content of the predicted species distribution data is (*n* = 0):	
g. I have concerns about the quality of the predicted species distribution data.	2
Q6: My main concern about the quality of the predicted species distribution data is (*n* = 2):	
The GAP models aren't being kept up to date, the covariates associated with the predicted distribution aren't well known, and there is no means of vetting the results.	
Models over-predict occurences.	
h. I have concerns about the content of the stewardship/protected areas data.	1
Q7: My main concern about the content of the stewardship/protected areas data is (*n* = 1):	
Distribution of species in protected areas.	
i. I have concerns about the quality of the stewardship/protected areas data.	
Q8: My main concern about the quality of the stewardship/protected areas data is (*n* = 0):	

j. GAP data are not compatible with the hardware that I use.	
Q9: The hardware I use is (*n* = 0):	
k. GAP data are not compatible with the other software packages I use.	1
Q10: The software package I use is (*n* = 1):	
TEISS	
l. Lack of information on how to use GAP data.	8
m. Lack of support from my organization for use of GAP data.	
n. I use data similar to GAP data but that is provided by a different source.	17

How GAP Data Have Been Used

Survey respondents were asked to identify how they used GAP data. GAP data are publicly available and can be obtained by anyone with internet access and appropriate software. Therefore, we could not assume how the data were being used.

Q11 Please indicate below the main issue that you used GAP data to address. (*n* = 283)

Response	Percent
a. Agriculture	1
b. Biodiversity conservation	**35**
c. Climate change	1
d. Ecological/Ecosystem monitoring	12
e. Geology/Hydrology	
f. Engineering/Construction/Surveying	1
g. Fish and Wildlife management	22
h. Fire management	1
i. Forest management	5
j. Invasive Species	<0.5
k. Mapping/Cartography	8
l. Oil and gas/minerals exploration/extraction	
m. Range/Grassland management	<0.5
n. Recreation management	
o. Rural planning and development	2
p. Transportation planning	<0.5
q. Urbanization (growth, sprawl, etc.)	1
r. Water management (including coastal, wetland, and watershed management)	3
s. Other: [open-ended response] (*n* = 19)	7
Archaeological site location modeling	
Archaeological modeling	
Teaching	
Environmental Education	
In the context of Environmental Education/conservation education	
Public health risk assessment	
Planning and Permitting, EIS work	
Conservation land acquisition	
More specific land use and land class mapping and specific vegetation mapping	
Land Use/ Land Cover Modeling	

Ecosystem assessment	
Integrated ecological assessment	
Federal resources management	
Resource Management Planning and renewable energy projects	
Wetland restoration	
State forest resource planning and criteria and indicators reporting	
As ancillary data	
Issues 2–4 in this list	
Never used GAP data to address any issue	

Q12 Which option below most closely describes the purpose for which you used GAP datasets? (*n* = 281)

Response	Percent
a. To provide information regarding conservation-related policy issues such as land use.	**37**
b. To provide decisionmakers with knowledge about topics such as conservation concepts, models, or priorities.	30
c. To legitimize decisions, such as decisions about land use and land protection, made on the basis of other information.	14
d. To conduct academic research to fulfill course or degree requirements or for the purpose of publication.	11
e. To conduct applied research that is conducted for some reason other than to inform conservation decisionmaking.	8

Characteristics of Survey Respondents

These questions addressed respondents' characteristics. The questions primarily address organization-level demographics. The few individual-level questions that were asked relate to use of GIS.

Q13 Which category best describes your organization? (*n* = 339)

Response	Percent
a. Private (for profit)	8
b. State	**30**
c. University	17
d. County	2
e. Municipal	1
f. Federal	28
g. Non-profit	12
h. Regional	<0.5
i. Tribal	<0.5
j. Other: [open-ended response]	2

Q14 How important is the conservation of biodiversity in the mission of your organization? (*n* = 337, average = 4)

a. Not important (1)	b. Slightly important (2)	c. Important (3)	d. Very important (4)	**e. Critical (5)**
3%	8%	21%	30%	**38%**

Q15 Which field most closely describes your current position? (*n* = 339)

Response	Percent
a. Ecology	20
b. Biology	7
c. Conservation	14
d. GIS	**26**
e. Land Use Planning	3
f. Fish and Wildlife Management	16
g. Land Management	2
h Other: [open-ended response] (n = 42)	12
Botany (3)	
Statistics (2)	
Administration	
Agency Leadership and Management	
Air Quality Management	
Air Quality Planning	
Climate research	
Coastal Geology	
Coastal Zone Management	
Conservation Stewardship/Ecology	
Data management	
Economics	
Education/Outreach in Fish and Wildlife Managment	
Engineering Visualization Manager	
Forestry	
Geography	
Human Dimensions	
Information Technology	
Interdisciplinary	
Land Steward	
Land Use and Land Cover Change	
Landscape Architecture	
Landscape ecology	
Medical School	
Natural Resources Secialist	
Public health	
Public Relations	
Remote Sensing	
Research	
Science Advisor	
Systematics	
Water Quality and Watershed Management	
Water Quality Planning & Management	
Water Resource Engineering	
Water resources monitoring	

Wetland restoration/ecological monitoring	
I don´t have a paid position	
Ecology, Conservation, GIS, F & W Management (in retirement)	
No longer with the organization where I used the data	

Q16 What is the journal, newsletter, or publication that you read most frequently to keep current in your field? [open-ended response] (*n* = 235)

Some respondents listed more than one publication. Each publication was counted separately. Some respondents provided a response that was not the name of a publication.

Publication Name	Number of times named
Journal of Wildlife Management	**43**
Conservation Biology	37
Ecology	12
ArcNews	11
ArcUser	10
Photogrammetric Engineering and Remote Sensing	8
ESRI materials	7
Frontiers in Ecology and the Environment	7
Science	7
Landscape Ecology	6
Fisheries	5
The Auk	5
The Condor	4
Conservation	3
Directions Magazine	3
Forest Ecology and Management	3
Nature	3
Remote Sensing of Environment	3
Restoration Ecology	3
The Wildlife Society Bulletin	3
Transactions of the American Fisheries Society	3
Wildlife Professional	3
Biological Conservation	2
Bioscience	2
Canadian Journal of Fisheries and Aquatic Sciences	2
Ecological Applications	2
Ecological Monitoring	2
Imaging Notes	2
Journal of Forestry	2
Journal of Mammalogy	2
Journal of the American Water Resources Association	2
Journals from American Fisheries Society	2
Landscape and Urban Planning	2
Natural Areas Journal	2
Rangeland Ecology and Management	2

Society of American Foresters publications	2
The Wildlife Society publications	2
URISA Journal	2
Wetlands	2
Wilson Journal of Ornithology	2
American Journal of Botany	1
American Journal of Tropical Medicine and Hygiene	1
American Society for Training and Development	1
American Statistician	1
Animal Conservation	1
Annals of the Association of American Geographers	1
APA (American Planning Assoc.) publications	1
Arboriculture & Urban Forestry (ISA, Champaign, IL)	1
ArcWatch	1
Association of Computing Machinery	1
Audubon	1
Bulletin of American Meteorologists	1
Conservation Letters	1
CQ	1
Earth (formerly Geotimes)	1
Ecography	1
Ecological Engineering	1
Ecological Modeling	1
Endangered Species Bulletin	1
Environmental History	1
Environmental Modeling	1
Environmental Toxicology and Chemistry	1
ESA materials	1
Evolution	1
Fisheries Oceanography	1
Forest Science	1
GIS World	1
GPS World	1
High Country News	1
International Journal of Geographic Information Science	1
International Journal of Wildland Fire	1
JEP	1
Journal of Fish and Wildlife Management	1
Journal of Air and Waste Management	1
Journal of Applied Ecology	1
Journal of Biogeography	1
Journal of Coastal Research	1
Journal of Environmental Economics and Management	1
Journal of Field Ornithology	1
Journal of Raptor Research	1

Journal of the American Statistical Association	1
Journal of the Linnean Society	1
Native Plants Journal	1
Natural Areas Management	1
NC Conservation Network Bulletin	1
NOAA Coastal Services Magazine	1
North American Journal of Fisheries Management	1
Northeastern Naturalist	1
Oikos	1
Park Science	1
Partners In Flight stuff, national and regional	1
Planning	1
Plant Ecology	1
PLoSOne	1
Proceedings of the National Academy of Sciences, USA	1
Review of Environmental Economics and Policy	1
Revista de Biología Tropical	1
Saving Land (Land Trust Alliance)	1
Science News	1
Society for Conservation Biology publications	1
Society for Ecological Restoration publications	1
Systematic Biology	1
Systematic Botany	1
The Conservationist	1
The Wildlifer	1
Urban Forestry & Urban Greening	1
Ursus	1
Wilson Bulletin	1
WMI Outdoor news bulletin	1
Other comments made in response to this question that were not names of publications:	
Theme: Multiple resources (n = 13)	
Multiple (2)	
I read a combination of publications (all with equal frequency) to keep current in my field.	
Many journals - there is no one source	
Many journals and books	
Many...it depends on the issues we are working.	
Multiple journals, no one in particular	
No single journal or newsletter---following many different sources	
None in particular, there are a number of them	
Read a variety of all of these	
Various	
Various taxa specific publications	
Various wildlife management journals, newsletters, publications	
Theme: Internet resources (n = 12)	
Internet	

Links from aquatic invasive species listservs and newsletters	
Developer blogs	
EPA, USGS, ACWA and ECOS listservs	
Google summaries from news organizations on conservation topics of interest	
Mostly use internet searches	
On line news from various sources	
Online articles from a variety of resources	
Probably messages on the wildlife transportation list serve	
Through internet several pages	
We use mostly the Internet	
I do not read any one publication but read various articles from websites, webinars and enewsletters	
Theme: Not one in particular (n = 3)	
No single journal	
Don't rely heavily on one journal.	
I don't read any one journal more frequently than others.	
Theme: None (n = 3)	
Theme: Communications with colleagues (n = 2)	
Climate science updates which are circulated by colleagues.	
Communication with members of the NC Conservation community and the network of natural heritage programs	
Theme: Depends on the topic (n = 2)	
I read by subject, not journal.	
Really depends on the topic of interest.	
Theme: Discipline specific journals (n = 2)	
Herpetology journals	
Several GIS related journals	

Q17 In your current position, which of the following roles with respect to GIS data do you fill? Please select all that apply. (*n* = 339)

Response	Number of times selected	Percent
a. Acquire datasets	193	57
b. Create datasets	189	56
c. Maintain datasets	144	42
d. Inventory datasets	93	27
e. Distribute datasets	143	42
f. Use datasets to create information products	**249**	**73**
g. I do not have any roles with respect to GIS data	42	12

Q18 How long have you been using GIS technology? (*n* = 336, average = 5)

a. Less than 1 year (1)	b. 1–2 years (2)	c. 3–5 years (3)	d. 6–10 years (4)	**e. More than 10 years (5)**	f. I have never used GIS technology (no value)
2%	1%	6%	19%	**68%**	5%

Q19 What was the main source of training you had on the use of GIS? (*n* = 326)

Response	Percent
a. I am self-taught in GIS	**29**
b. Informal on the job training from a co-worker	18
c. Formal training provided by employer	13
d. Professional seminar on GIS provided by company other than employer	9
e. Formal undergraduate level GIS course	8
f. Formal graduate level GIS course	24

At this point, the respondents who selected response d to Q1 (I am not familiar with GAP and believe I have received this survey in error) skipped forward in the survey to Q209.

Q20 What level of GIS skill is necessary to use GAP data? (*n* = 311)

Response	Percent
a. No skill required	5
b. Must have basic GIS skills	**64**
c. Must have intermediate GIS skills	29
d. Must have advanced GIS skills	2

Acquisition of GAP Data

Q21 How did you first learn about the types of GAP data available? (*n* = 322)

Response	Percent
a. I was a partner in a state GAP project.	**33**
b. I learned about it in school and used it for school projects.	8
c. I found it online on the GAP web site.	8
d. I found an online link to GAP from another web site.	1
e. Someone I knew told me about it.	22
f. GAP data were referenced in a publication I read.	5
g. GAP data were referenced in a conference presentation I attended.	5
h. Other: [open-ended response]	19
Theme: Learned about GAP through connection with another person or agency (n = 19)	
Worked with colleagues that helped develop applications for use of GAP data	
Work colleagues	
Our consultants used it on our behalf for regional planning	
My co-worker and supervisor who is an ornithologist was versed in GAP data	
Minnesota Land Management (LMIC) & MNDNR	
Learned about it from other colleagues.	
Learned about it at work	
LCC meeting	
I was supervised by a partner in a state GAP project	
I took a job in a lab that ran a regional GAP project, but I had nothing to do with it.	
GAP data used by conservation partners in joint project	
GAP data are often mentioned within my agency	
From colleagues working in GAP program	
Followed the project since inception in other parts of US	

Co-workers were partners in state GAP project	
Cost-share project with The Nature Conservancy	
Colleagues involved in the state GAP project.	
I heard Mike Scott talk as he developed GAP years ago	
Coworker participated in GAP development	
Theme: Worked for GAP or with GAP as a partner or collaborator (n = 16)	
Worked with U Arizona during initial development of GAP.	
Provided local data	
My state agency created the data	
I was the PI for the ND GAP Analysis	
I was contacted by USGS to groundtruth it in my area	
I was an analyst and field worker for SWreGAP 2005 RS-GIS LAB USU	
I was a staff member developing state GAP products	
I was a research associate on our State GAP Project	
I used to work for the GAP program	
I provided data	
I house the SEGAP program at the NC Coop Unit	
I helped initiate GAP	
I developed some of the datasets.	
Early partner in national project.	
Collaborator with GAP since its inception	
Federal partner agency	
Theme: GAP data was available at workplace (n = 8)	
Work project utilizing GAP dataset	
I re-ran the second set of models for a state gap project, but wasn't necessarily a partner	
GAP data was in use at my work place.	
GAP Data was available on the Forest where I worked	
GAP data is available within my agency's data sets	
GAP data are part of our core GIS library	
Available on the Forest	
Employer	
Theme: Learned about GAP data as part of education (n = 5)	
My major advisor was a state GAP coordinator.	
Learned of it for use in masters thesis	
It was part of my graduate school work	
GAP was a big project at UCSB while I was there.	
Been using it for years. First heard about it in grad school, but never used it for any grad-related projects.	
Theme: Referenced affiliation with USGS (n = 5)	
USGS staff from 1997 to 2005	
USGS Management	
I was an original member of NBS and USGS BRD	
I was a research associate on the USGS NBII project	
I am a USGS employee	
Theme: Cannot remember (n = 2)	

I don't recall exactly.	
I cannot remember---it has been too long.	
Theme: Don't know what types of data are available (n = 2)	
I have no idea what is available.	
I don't know what types are available	
No theme:	
Became database administrator	

Q22 What was the primary method you used to get GAP data that you use? (*n* = 318)

Response	Percent
a. It was distributed directly to me by the GAP program.	26
b. I downloaded it off of the GAP web site.	**33**
c. A colleague sent it to me.	16
d. I am familiar with GAP data but have not used it.	11
e. Other: [open-ended response]	13
Theme: Created or produced data (n = 15)	
We created it (2)	
When I used it, I was also the one creating the data coverages	
We created or prepared most of it	
Produced it	
My unit created it so I had it locally.	
I was the AZ PI and had the data in my posession	
I was one of the PI's who created the data set for Hawaii	
I helped create it.	
I have access to data since we produce it	
I generated the data	
I developed it	
Developed and used data	
I was involved in creating the data sets	
My organization contributes to the protected lands layer	
Theme: Data is maintained by the agency or employer (n = 9)	
State GIS GAP layers on a central GIS drive	
Obtained it from the GIS shop in our agency	
My agency maintains it on the server.	
It is incorporated into our available data sets. Our GIS people have taken GAP data and corrected it where it was deficient to create a better dataset for our use.	
Internal datasharing services	
GAP data are distributed as part of our state core GIS library	
DNR has GAP data available for its employees on our data deli	
Copies are stored on my agency's servers	
Already available on BLM server	
Theme: GAP data provided by some other source (n = 6)	
State of Minnesota provided it	
My supervisee downloads it	
Got if from UC Santa Barbara around the year 2000	
Gap partner	

GAP collaborators gave it to me	
A Partnership Server	
Theme: Downloaded from a different site (n = 4)	
Utah GIS portal (AGRC)	
Downloaded from MN DNR Site	
Download from project web sites (SEGAP, ALGAP)	
Downloaded from spatial data library	
Theme: I have not used GAP data (n = 3)	
I have never used GAP data.	
I don't use it	
Co-worker used it...not me	
Theme: Multiple sources used to get GAP data (n = 2)	
All of the above over time	
We use multiple products. Some downloaded from web, some distributed directly	
No theme:	
I collected it and have down loaded data for other regions	
Downloaded the GAP standards and created our own GAP database.	
Do not remember	

GAP Datasets—Geographic Sets of Data

This section of the survey included questions that asked respondents about GAP datasets. In order to identify the dataset on which respondents were basing their responses, respondents were asked to identify the datasets with which they were most familiar. Respondents were directed to answer subsequent questions keeping in mind the dataset they had identified as the one with which they were most familiar.

First, respondents were asked to identify if they were most familiar with state, regional, or national GAP datasets. On the basis of the answer to that question, they were directed to survey questions specific to that level of data. If respondents answered that they were most familiar with state data, they were asked to identify the state. If respondents answered that they were most familiar with regional data, they were asked to identify the specific GAP regional project.

Q23 With which geographic set of data are you most experienced or familiar? (*n* = 316)

Response			Percent
a. State:			**71**
Please select the state or U.S. territory for the GAP dataset with which you are most familiar: (*n* = 220)			
Minnesota	**16**	**7%**	
Wyoming	15	7%	
Puerto Rico	12	6%	
North Carolina	11	5%	
Iowa	10	5%	
Washington	9	4%	
Arizona	8	4%	
California	7	3%	
Idaho	7	3%	

Kentucky	7	3%	
Missouri	7	3%	
Colorado	6	3%	
Kansas	6	3%	
Florida	5	2%	
Illinois	5	2%	
Michigan	5	2%	
New York	5	2%	
Pennsylvania	5	2%	
Wisconsin	5	2%	
Alaska	4	2%	
Arkansas	4	2%	
Hawaii	4	2%	
Nebraska	4	2%	
Texas	4	2%	
Vermont	4	2%	
Alabama	3	1%	
Maine	3	1%	
Montana	3	1%	
New Mexico	3	1%	
Oklahoma	3	1%	
Oregon	3	1%	
South Dakota	3	1%	
Indiana	2	1%	
Louisiana	2	1%	
Nevada	2	1%	
New Hampshire	2	1%	
North Dakota	2	1%	
Ohio	2	1%	
South Carolina	2	1%	
Tennessee	2	1%	
Utah	2	1%	
West Virginia	2	1%	
Delaware	1	1%	
Mississippi	1	1%	
New Jersey	1	1%	
Virginia	1	1%	
b. Regional:			20
Please select the regional GAP dataset with which you are most familiar: (*n* = 59)			
Southwest	**30**	**51%**	
Northwest	15	25%	
Southeast	14	24%	
c. National:			10

Respondents who were familiar with state data were next asked Q27. Respondents who were familiar with regional data were next asked Q24, and respondents who were familiar with national data were next asked Q30.

Questions about Regional Datasets

Q24 I prefer regional datasets because they are more accurate than state data. (*n* = 59, average = 3)

a. Strongly disagree (1)	b. Somewhat disagree (2)	**c. Neither agree nor disagree (3)**	d. Somewhat agree (4)	e. Strongly agree (5)
7%	15%	**50%**	19%	10%

Q25 I use regional datasets because they are more current than state data. (*n* = 56, average = 3)

a. Strongly disagree (1)	b. Somewhat disagree (2)	**c. Neither agree nor disagree (3)**	d. Somewhat agree (4)	e. Strongly agree (5)
7%	14%	**38%**	25%	16%

Q26 Regional datasets meet my needs for data more closely than state data. (*n* = 56, average = 4)

a. Strongly disagree (1)	b. Somewhat disagree (2)	c. Neither agree nor disagree (3)	d. Somewhat agree (4)	**e. Strongly agree (5)**
2%	2%	11%	34%	**52%**

Questions about State Datasets

Q27 I prefer state datasets because they are more accurate than regional data. (*n* = 217, average = 4)

a. Strongly disagree (1)	b. Somewhat disagree (2)	**c. Neither agree nor disagree (3)**	d. Somewhat agree (4)	e. Strongly agree (5)
2%	6%	**53%**	24%	16%

Q28 State datasets meet my needs for data more closely than regional data. (*n* = 217, average = 4)

a. Strongly disagree (1)	b. Somewhat disagree (2)	c. Neither agree nor disagree (3)	d. Somewhat agree (4)	**e. Strongly agree (5)**
2%	4%	24%	34%	**37%**

Q29 There are no regional data available for my location. (*n* = 213, average = 3)

a. Strongly disagree (1)	b. Somewhat disagree (2)	**c. Neither agree nor disagree (3)**	d. Somewhat agree (4)	e. Strongly agree (5)
18%	10%	**58%**	7%	8%

Questions about National Datasets

Q30 I use the new national datasets because the national data is the most recently produced dataset. (*n* = 24, average = 4)

a. Strongly disagree (1)	b. Somewhat disagree (2)	**c. Neither agree nor disagree (3)**	**d. Somewhat agree (4)**	e. Strongly agree (5)
	8%	**38%**	**38%**	17%

Q31 I use the new national datasets because I need data that is consistent at a national scale. (*n* = 25, average = 4)

a. Strongly disagree (1)	b. Somewhat disagree (2)	c. Neither agree nor disagree (3)	d. Somewhat agree (4)	**e. Strongly agree (5)**
		20%	24%	**56%**

Q32 I use the new national datasets because the way that national data is provided on the GAP web site makes it easier to access and use than the state or regional datasets. (*n* = 25, average = 3)

a. Strongly disagree (1)	b. Somewhat disagree (2)	**c. Neither agree nor disagree (3)**	d. Somewhat agree (4)	e. Strongly agree (5)
4%		**56%**	24%	16%

GAP Datasets—Types of Data

Within the different geographic levels of GAP data (state, regional, and national), GAP produces multiple types of data. Respondents were asked with which type of data they had the most experience or with which type they were most familiar. This question permitted the identification of the type of GAP data the respondents were using as the basis for their responses to the survey questions and permitted the survey to be adapted to the specific background of the respondent.

Q33 With which type of GAP data are you most experienced or familiar? (*n* = 304)

Response	Percent
a. Land cover	**57**
b. Predicted Species Distributions	22
c. Stewardship/protected areas	10
d. Analysis (Land cover + Predicted Species Distribution + Stewardship/protected areas)	11

Q34 The GAP data I need for my area are available. (*n* = 303, average 4)

a. Strongly disagree (1)	b. Somewhat disagree (2)	c. Neither agree nor disagree (3)	**d. Somewhat agree (4)**	e. Strongly agree (5)
4%	7%	15%	**38%**	37%

Q35 I have to add to GAP datasets or manipulate the data to make it useful. (*n* = 304, average 3)

a. Strongly disagree (1)	b. Somewhat disagree (2)	c. Neither agree nor disagree (3)	**d. Somewhat agree (4)**	e. Strongly agree (5)
8%	14%	31%	**38%**	9%

If respondents agreed either somewhat or strongly with Q35, they were asked Q36 as a follow up question.

Q36 What change or manipulation do you usually make to GAP data in order to make it useful? [open-ended response] (*n* = 114).

Several respondents made multiple comments. If a respondent made multiple comments, the comments were split into independent components before the responses were summarized.

Response
Theme: Combine with other data (n = 26)
Use with finer scale landcover data where it is available.
Use only certain features of the GAP data and add these to a more recent land cover layer to create a better representation of Kentucky land use.
Use it in conjunction with other information and data
Use different wetlands layer
Other than selecting air-pollutant sensitive species, I then have to pull in an in-house generated US Indian Treaty cession boundaries and the ICC sub-cession boundaries.
I use additional protected areas data to add information.
I add in more local data if I have it for a particular system or re-classify types for areas where we might have updated information.
For county work I use our new vegetation/ecosystems dataset along with the ReGAP dataset for Nevada
Fine tune with local data
Combined with elevation and terrain data
Combine with other data sets
Combine datasets to conduct analyses
Before PADUS and NCED had to add in smaller protected areas, easements, etc.
Adding stewardship areas not in the GAP database.
Add watershed and cover type data
Add stand ages or seral stage to the landcover categories
Add other physical environmental data
Add other data layers (e.g., NWI, soils).
Add landfire data for AR, TX, LA, OK
Add invasive species
Add in layers for wetlands
Add additional datasets.
I work with Great Lakes Aquatic GAP data. I add outside layers for analysis
I use GAP data for coarse-scale analyses and combine it with fine-scale data on species and community-level occurrence data.
In-house data sets for the species(s) of interest
I incorporate it into analyses.
Theme: Reclassify (n = 20)
We have been representing the PAD-US according to both ownership type and status.

	Reclassify to appropriate level of correctness
	Reclassify the map
	Re-classify legend into a one-to-many, many-to-one step up that lines up with a state ecological classification system
	Reclassify incorrectly identified landcover types
	Reclassification to consolidate Level 4 to Level 3 in most instances because Level 4 resolution is unrealistic
	Reclassification to (simpler) themes that are useful to conservation planning.
	Reclassification of vegetation types. Modifying species distribution models
	Reclassification
	For the landcover dataset, the detail within the cover types are often too specific or with names that are convoluted. I commonly have to combine or rename several veg. types into groups of similar classes to make it useful for presentation/communication with non GAP users.
	Collapse/expand land cover categories
	Aggregation of cover types
	Aggregate to categories needed for my investigation.
	Aggregate some lc types to match more current lc data so comparisons can be made over time
	Aggregating land cover categories that were too similar
	"Lump" categories to make them more appropriate to my needs or simply have a smaller (less unwieldy) number of categories to deal with.
	More detailed landcover down to forest community types, inundation data,
	We have added in protected areas that are missing in the PAD. We have changed the status rank on some areas based on local expert knowledge
	Lump or split some cover types
	Grouping LULC categories to cross-walk with Canadian datasets
Theme: Update (n = 11)	
	Updating species models, PAD, and land cover
	Updating
	Updated and better done.
	Update with more training data
	Update species distributions
	Update land management status.
	Intersect it with other more current data.
	Augment with more recent data layers.
	Add more recent data.
	Replace it with updated data that I've collected.
	More specific, localized information/ updated data
Theme: Correct accuracy (n = 10)	
	Oak is overrepresented in the Willamette Valley ecological systems coverage. I have used ancillary datasets to remove pixels of oak for which support is weak that oak do indeed exist there.
	Land cover is not always accurate. Particularly for sub-state level (e.g., multi-county) analyses, I have had to correct the more egregious departures from reality. The categories of "recently burned" or "recently chained" are also of minimal use and need to be reclassified to an actual land cover (not a land management activity).
	Identifying and fixing issues of misclassification in the landscover map, and extending wildlife models into areas that have not been updated.
	I correct GAP land cover classification errors by referencing other datasets, both vector and raster. For example, MnDOT data is used to improve the GAP built-up areas, and NWI data is used to distinquish upland and wetland natural land cover types.

GAP land cover data for Florida are full of errors and are now out of date relative to other land cover data layers available for the state. Thus, GAP data are not very useful for Florida.
Corrected misclassifications, added land cover types
Change land cover types and areas as needed from groundtruthing.
Correcting omissions in land status layer
Spatial clean up of specific type distributions based on field knowledge and samples data
Southwest ReGAP is generally based on NM. In AZ we have found errors in Veg data and have had to correct it. Also, the species distributions are often way out of line with what we know about actual distributions and must be corrected to be useful
Theme: Refine (n = 6)
Simple modifications to species examined, buffers, etc.
Refining predicted species distributions.
I smooth the data when I need to generalize
Filter techniques applied to landcover
Clean up field and farm boundaries
Editing some land cover where better information is available; editing protected areas database
Theme: None (n = 6)
None (2)
Was not possible to use it for accurate characterization of upland cover types
I'm not really using it any more, and never really did. Was aware of it, but was not specific enough to suit my needs.
The state and regional data are not sufficient for Pima County information. We have created our own GAP stewardship database based on GAP standards.
We are developing our own land cover/ecological Systems
Theme: Clip (n = 5)
Clipping, conversion to another file type
Clip to State Boundaries
Clip land cover dataset to state, to reduce file size
Clip it to project areas
Clip and zip from the national dataset. I need a state plus buffer, and must download all surrounding states and then clip.
Theme: Merge/edge matching (n = 5)
Sometime I have to include portions of other states or remove a portion of a region.
Merge datasets or regions together, i.e. states needed merging
Edge matching across political boundaries (when regional datasets were not available)
I had to stitch together multiple state datasets to create regional data requiring a crosswalk of cover types.
We had to crosswalk KS and MO data
Theme: Selective use (n = 4)
Typically I need to select data for only certain species as well as data for particular species use areas (i.e., breeding habitat)
Applications require that I buffer or select data to conform with sampling schemes. It is not that the landcover data need to be changed.
Selecting certain attribute fields of interest, clipping and recalculating acreage, overlaying
Extract specific lists of vertebrate species from species codes.
Theme: Validate/groundtruth (n = 3)
Validate for accuracy of location.
Data accuracy verification through comparison with other datasets

Check against other data sets, do some ground truthing to get a sense of error rates.
Theme: Projection (n = 2)
Projection/Coordinate System
Project the data to conform to a State standard
Theme: Resolution (n = 2)
The resolution is too coarse
Reprojection, aggregation to coarser spatial resolution
No theme:
The intersection of a single species distribution with land cover and protected areas is never enough.
Symbols, measurement
Summarize forest types; e.g. woodlands included
Subsetting to project AOI's for Engineering project Visualization. Putting it in context with other data. Qualifying via metadata its lineage and level of accuracy in order to make disclaimers
Specific land uses
Usually it's just a matter of understanding how historical versus current distributions are attributed, perhaps seasonality attributes, to select and color a map the way it's most useful.
Use basemap to have contextual information.
Move it to an open source data framework
Merge attributes
In the past I have been interested in identifing ecotones of key vegetation types that are important in assessing risk for vector-borne diseases. I therefore buffered the vegetation types of interest and identified the intersects of these buffers.
Import for ArcGIS, clean data, visualize data, merge and blend data
I used the species data to model current and predicted future species distribution.
Ecoregions, county biological surveys, species ranges, land ownership
Develop new species distribution models to evaluate specific scenarios about future landscape conditions.
Connecting stream networks
Compare to other data, such as LandFire Existing Veg Type
Calculate or gather stream attributes; fix stream density issues
Attributing data to the national spatial framework that I use for my research
Rescaling coverage data to fit other environmental datasets

Q37 In using GIS data in general, what extent (area of interest) do you most commonly use? The words "county" and "state" in response options are only given for general reference. (*n* = 294)

Response	Percent
a. Smaller than a county	16
b. About the size of a single county	9
c. Multiple counties	20
d. State	**32**
e. Multiple states	16
f. National	7

Q38 In using GAP data, what extent (area of interest) do you most commonly use? The words "county" and "state" in response options are only given for general reference. (*n* = 248)

Response	Percent
a. Smaller than a county	13

b. About the size of a single county	13
c. Multiple counties	27
d. State	**40**
e. Multiple states	
f. National	8

At this point in the survey, respondents were directed to specific sets of questions depending upon their answer to Q33 which indicated with what type of GAP data they were most familiar. Respondents who indicated they were most familiar with land-cover data were directed to Q39. Respondents who indicated they were most familiar with predicted species distribution data were directed to Q59. Respondents who indicated they were most familiar with stewardship/protected areas data were directed to Q84, and respondents who indicated they were most familiar with GAP analysis data were directed to Q105.

Land-Cover Data

Q39 GAP land-cover data are useful at the following levels (select all that apply). (*n* = 167)

Response	Number of times selected	Percent
a. National	76	46
b. Regional	115	69
c. Ecosystem	101	60
d. State	**127**	**76**
e. County	87	52
f. Refuge	31	19
g. Other: [open-ended response]	14	8
Theme: Watershed (n = 3)		
Watershed		
Large (e.g., western) counties or similar sized watersheds		
At level 12 hydrologic water catchment area		
Theme: Conservation easement (n = 2)		
Conservation property (for example, conservation easement on a ranch)		
Conservation Easement		
Theme: Depends on purpose (n = 2)		
Question has multiple contexts for me. For Engineering projects, county size or less is relevant, but for some uses it must be put in larger context, and obviously ecosystems/habitat does not stop at arbitrary political boundaries		
Depends on the purpose		
Theme: No opinion (n = 2)		
I have only been involved in one project that we used land cover data at the state level, I don't really have an opinion due to lack of knowledge		
I do not use GAP data and do not have an opinion		
No theme:		
National Forest		
Multi-county, esp. those that cross state lines. Also, by "ecosystem" I assume you mean an ecoregion that crosses mutliple states.		
In cases where that is all that is available		

ECS subsection		
BLM District, BLM Field Office levels		

Q40 GAP land-cover data are necessary at the following levels (select all that apply): (*n* = 164)

Response	Number of times selected	Percent
a. National	92	56
b. Regional	115	70
c. Ecosystem	103	63
d. State	**119**	**73**
e. County	89	54
f. Refuge	38	23
g. Other: [open-ended response]	13	8
Theme: Questioning "necessary" (n = 2)		
Unclear what is implied by 'necessary' - 'the only option'?		
Huh? You are assuming it is 'necessary'.		
Theme: No opinion (n = 2)		
No informed opinion		
I do not use GAP data and do not have an opinion		
No theme:		
Watershed		
Varies a lot and depends on area of state		
Not necessary at any level		
Multi-county, esp. those that cross state lines. Also, by "ecosystem" I assume you mean an ecoregion that crosses mutliple states.		
In cases where that is all that is available		
Depends on the purpose		
Conservation Easement		
BLM District, BLM Field Offices levels		
Any property of ecological significance		

Q41 How important is it to have consistent seamless national coverage of vegetation? (*n* = 167, average = 4)

a. Not important (1)	b. Slightly important (2)	c. Important (3)	**d. Very important (4)**	e. Critical (5)
3%	7%	22%	**40%**	28%

Q42 How frequently should GAP land-cover data be produced? (*n* = 169)

Response	Percent
a. Yearly	7
b. Every 2–4 years	34
c. Every 5–7 years	**47**
d. Every 8–10 years	7
e. Other: [open-ended response]	5
Theme: Approximately 5 years (n = 3)	
Five to seven year but also do the timing relative to socioeconomic data from the Census folks	
As often as possible; at least every 5 years	

5 years intervals would be ok	
Theme: No opinion (n = 2)	
I do not use GAP data and do not have an opinion	
Have only used data once, don't know enough about land data to make an informed decision	
No theme:	
Never - stop doing it and let LandFire/NatureServe do it	
I have yet to see a finished product for Maryland or the northeast	
Depends on how frequently land cover changes	

Q43 For my purposes, GAP land-cover data are relevant. (*n* = 164, average = 4)

a. Strongly disagree	b. Somewhat disagree	c. Neither agree nor disagree	d. Somewhat agree	**e. Strongly agree**
(1)	(2)	(3)	(4)	**(5)**
3%	2%	10%	34%	**51%**

Q44 I believe that GAP land-cover data are reliable. Reliable data are accurate, complete, dependable, and consistent. (*n* = 165, average = 4)

a. Strongly disagree	b. Somewhat disagree	c. Neither agree nor disagree	**d. Somewhat agree**	e. Strongly agree
(1)	(2)	(3)	**(4)**	(5)
2%	14%	18%	**53%**	12%

Q45 Appropriate processes were used to assemble GAP land-cover data. (*n* = 165, average = 4)

a. Strongly disagree	b. Somewhat disagree	c. Neither agree nor disagree	**d. Somewhat agree**	e. Strongly agree
(1)	(2)	(3)	**(4)**	(5)
	5%	29%	**44%**	22%

Q46 GAP land-cover data are sufficiently current for my use. (*n* = 164, average = 3)

a. Strongly disagree	b. Somewhat disagree	c. Neither agree nor disagree	**d. Somewhat agree**	e. Strongly agree
(1)	(2)	(3)	**(4)**	(5)
14%	26%	21%	**30%**	9%

Q47 The appropriate set of GAP land-cover data was available when I needed it. (*n* = 164, average = 4)

a. Strongly disagree	b. Somewhat disagree	c. Neither agree nor disagree	**d. Somewhat agree**	e. Strongly agree
(1)	(2)	(3)	**(4)**	(5)
5%	15%	21%	**40%**	19%

Q48 GAP land-cover data are the best available data. (*n* = 165, average = 3)

a. Strongly disagree	b. Somewhat disagree	**c. Neither agree nor disagree**	d. Somewhat agree	e. Strongly agree
(1)	(2)	**(3)**	(4)	(5)
13%	22%	**28%**	26%	12%

Q49 GAP land-cover data are easy to use with other datasets. (*n* = 165, average 4)

a. Strongly disagree	b. Somewhat disagree	c. Neither agree nor disagree	**d. Somewhat agree**	e. Strongly agree
(1)	(2)	(3)	**(4)**	(5)
2%	3%	27%	**45%**	24%

Q50 GAP land-cover data are developed through cooperation with stakeholders (potential users of data). (*n* = 163, average = 4)

a. Strongly disagree	b. Somewhat disagree	**c. Neither agree nor disagree**	d. Somewhat agree	e. Strongly agree
(1)	(2)	**(3)**	(4)	(5)
1%	3%	**44%**	36%	17%

Q51 It is easy for me to access the GAP land-cover data I need. (*n* = 165, average = 4)

a. Strongly disagree	b. Somewhat disagree	c. Neither agree nor disagree	**d. Somewhat agree**	e. Strongly agree
(1)	(2)	(3)	**(4)**	(5)
1%	3%	19%	**39%**	38%

Q52 GAP land-cover data are sufficiently complete for my intended uses. (*n* = 163, average = 3)

a. Strongly disagree	b. Somewhat disagree	c. Neither agree nor disagree	**d. Somewhat agree**	e. Strongly agree
(1)	(2)	(3)	**(4)**	(5)
7%	16%	29%	**37%**	12%

Q53 At what level would you rate the quality of GAP land-cover data? (*n* = 162, average = 3)

a. Very low	b. Low	**c. Medium**	d. High	e. Very high
(1)	(2)	**(3)**	(4)	(5)
3%	4%	**52%**	39%	3%

Q54 To what extent do GAP land-cover data meet your expectations? (*n* = 162, average = 3)

a. Not at all	b. Meets some expectations	**c. Meets most expectations**	d. Meets all expectations
(1)	(2)	**(3)**	(4)
6%	38%	**55%**	2%

Q55 In your opinion, what one type of information or feature could be added to GAP land-cover data to make the data more useful? [open-ended response] (*n* = 88)

Several respondents made multiple comments. If a respondent made multiple comments, the comments were split into independent components before the responses were summarized.

Response
Theme: Update (n = 20)
We need the dam thing updated for Arkansas!
Updated for fire information
The data should be more up-to-date.
No new features - just a refresh with more current imagery.
Needs updated
Needs to be more current
More up-to-date

More recent data
More frequent/current data
More frequent updates
Just update it every three years to include land cover changes
It should be updated with cooperators' latest findings.
It needs to be updated using current interpretive methodologies
An update is needed.
Accurate, up-to-date cover types
A reliable refresh schedule for landcover updates.
Not the content as much as the currentness. Iowa is almost 20 years old, based on satellite acquisition dates.
Updated more regularly
Updated frequency
Regular 2-3 yr classifications with accuracy assessments per class.
Theme: Change classification (n = 11)
More LC categories
More distance classes would be useful.
Classification categories that are most linked to landscape integrity and water quality
If we could distinguish between major deciduous forest types, that might be helpful with species modeling.
Upland or lowland forest
Higher level of classification
For Hawaii GAP, we created too many landcover classes which greatly reduced user accuracy. National stewardship categories did not adequately reflect our local stewardship types. I now recommend LANDFIRE because the landcover classes are clearly defined and consistent.
Finer splits in vegetation cover
Relevant classes for climate research related to physiological functions of vegetation types rather than just descriptive classification.
Improve integration of multiple classification units and scales (coarse-fine with NVC units; i.e., with new alliances, 'mappable alliances' going finer, plus upper NVC hierarchy and Cowardin levels for wetlands)- see NatureServe map attributes.
Crosswalks to other/older vegetation classifications
Theme: Verification (n = 9)
More ground control
More field checking
Greater ground truthing, more precise
Accuracy Assessments
Accuracy assessment is needed.
Accuracy Assessment by state? or mapping zone. Overall accuracy is nice but if I am only using a state area, how good is it there? This might be able to be done with some sort of volunteer accuracy assessment using points in different states that are known. Some states are trying or are doing a network of known observation points for classification or accuracy assessment work.
Quality/accuracy assessment of the results
More truthing of roads, vegetation and all layers.
Accuracy assessment for the scale at which they are collected
More ground control
Theme: Add information (n = 9)
Stand ages or seral stages
Percent native plant cover

More detailed land use data
Landforms data
More urban use categories
Forest age.
Utilities locations for pipeline, transmission lines, and other utility lines.
I would like a canopy cover dataset
Condition/Quality of the habitat
Theme: Resolution (n = 7)
Increased temporal resolution
Landcover for example is categorized well, however the best thing that could happen is to have more refined resolution (somewhat coarse for many of our uses)
Higher resolution
Finer resolution
Better resolution
More spatial and thematic resolution
GAP analysis derived from higher resolution imagery - LandSat resolution is not good enough for Pacific Islands.
Theme: Improve accuracy (n = 6)
Accurately classified
Better accuracy
Classification accuracy
Improving accuracy and currency is more important than adding features.
Need to refine accuracy of categories and provide info on how categories are selected and combined or overlapped.
Many folks use GAP data at a regional scale. In my case, we use GAP data for somewhat rare landcover types (e.g. patches) in a regional context. GAP identifies that these patches are there, but it does a poor job identifying the spatial extent and size of these cover types at the patch level (e.g. aspen patches in matrix of sagebrush).
Theme: Ease of use (n = 6)
Easy to download, seamless and easy to incorporate into GIS
Easier ways to lump/split data
Ease of use
Easier format (geo-db, or shapefile not raster)
Data needs to be scalable and allow for analysis at both fine and broader scales.
Make clips available, to state boundaries with 1-mile or 3-mile buffer
Theme: Wetlands (n = 4)
Better wetlands cover
Better wetland information
Better riparian land cover
Better information on wetlands and updated land cover
Theme: Scale (n = 4)
Use of larger spatial scale imagery such as RapidEye to create land cover maps
Type is fine. Scale is the issue. NAIP is more useful to me.
It is all a matter of scale. At the State level GAP data is sufficient, to determine species habitat needs GAP data is not sufficient.
Raster cells of a finer scale
Theme: Classification consistency (n = 4)
Consistent cover types mapped across states/regions
More consistent use of landcover types across regions.

Consistency across borders
Consistent classification across scenes
Theme: Background information (n = 4)
Streamlined access to additional datasets that were used to compile the thematic layers.
Since the data are now provided as ecological systems, it would be nice to have the associated point data classified to the NVC. Possibly this is available and I have not sought it out??
Brief summary of modeling methods for integrated datasets
A source date for the land cover.
Theme: Availability of error/accuracy information (n = 4)
Integration of error matrix attributes into the dataset for direct use as opposed to having to refer to separate Excel spreadsheets by mapping zone
Information about mapping accuracy for each land cover class in an easily accessible location
I extensively use land cover data to create ecosystem maps for the Coronado National Forest. In places I've visited, sometimes the GAP data is on the money, and other times it's not close. Naturally, this has something to do with whether a particular place has been field checked. SO! The GAP data would be more useful if there was a layer that showed where the field team had visited, as well as the data they collected from the field. Then I could look at the land cover data for a particular place and know if it has been field checked or if it is simply the output of a very complicated algorithm.
Estimated error rates based on some kind of ground truthing or crowdsourced error checking. In some areas the data is fairly unreliable, and it would be great just to have some error bars on the data.
Theme: Structure (n = 3)
Structure
Structural data from lidar
Work with LANDFIRE to improve on vegetation structure (cover of non-woody and woody veg - need higher field-sample density) as compliment to ecological system type
Theme: No opinion (n = 3)
I'm putting an answer down for the next question, but you should know that I really have no idea; I don't really know the GAP data or processes that well.
I have no suggestions at this time.
Don't have an opinion
Theme: Smaller pixels (n = 2)
Smaller pixel size
Greater detail, smaller pixel resolution
Theme: Change map (n = 2)
A map of land cover change would be good.
Changes over five years
Theme: Agricultural classification (n = 2)
I think the biggest accuracy issue overall for my area of interest is the misclassification of some tilled agriculture as natural cover types and vice versa. Being able to distinguish tilled agriculture from irrigated hay meadows would also be very helpful.
Distinguish between different agricultural uses (e.g. tilled/grazed/mowed etc.)
No theme:
I am not aware of any reliable land cover Gap data for Texas.
Having a landcover for Maryland would be useful.

Q56 Are there alternative sources for the information provided in GAP land-cover data – similar data but from a different source? (*n* = 167)

Response	Percent
a. Yes	**74**
b. No	26

If respondents indicated there were alternative sources in Q56, they were asked to name the primary alternative (Q57). If respondents answered "No" to Q56, they were directed next to Q58.

Q57 Name the primary alternative to GAP land-cover data. [open-ended response] (*n* = 108)

Several respondents named multiple alternative datasets. In those cases, each database named was listed separately before the responses were summarized.

Response
Theme: State data (n = 26)
Kentucky Landscape Snapshot (2)
ALRIS (Arizona Land Resource Information System)
CALVEG
For our state the Minnesota DNR has a great wealth of information
FWC vegetation and land cover (Florida Fish and Wildlife Conservation Commission)
In Colorado, state-created Basinwide Vegetation & Land cover dataset--but has many internal inconsistencies
Individual state products
Kansas DASC coverages
KARS data at the state level
Land cover maps from the Division of Wildlife
Level III/IV land use/land cover data available from Florida's water management districts.
MN Landcover Classification System
Natural Heritage New Mexico
NH Land Cover Assessment data (state)
NJDEP Land Use Land Cover (New Jersey Department of Environmental Protection)
Other land cover data at the state-wide level.
Several states have their own versions of GAP or something similiar. For example, Florida has multiple coverages for priority habitats, wetland species concentrations, etc.
Some state data sets
State classifications, though not consistent nor comprehensive.
State IFMAP, MNFI datasets, etc.
State land use land cover GIS data
State provided land cover
State-level data layers
Texas Parks and Wildlife Department Ecological Mapping Systems of Texas data.
Texas Parks and Wildlife Ecological Mapping System Data
Theme: National Land Cover Data (n = 24)
NLCD (13)
National Land Cover Dataset (2)
National Land Cover Data (2)
National Land Cover Database
National Land Cover Dataset with associated products

National land cover is similar but different
NLC database
MRLC (Multi-Resolution Land Characteristics Consortium)
NLCD at national levels
NLCD, more current but categories aren't exactly the same.
Theme: LANDFIRE (n = 21)
Landfire (15)
LandFire at national levels
LANDFIRE EVT
LANDFIRE Existing Vegetation Cover
Landfire land cover
LANDFIRE most commonly
LANDFIRE, which includes GAP data but also includes other sources.
Theme: Local data (n = 9)
County or project level data could be used to make GAP better.
Irregularly available county datasets
Local contracted coverages
Local land use and land cover
Local vegetation data--limited to the land base managed by the unit
Local/regional agency-created land cover maps
NEAFWA habitat classification map
Regional or county vegetation data
Various local sources
Theme: National Oceanic and Atmospheric Administration – Coastal Change Analysis Program (C-CAP) (n = 5)
C-CAP (2)
C-CAP data
CCAP Landcover
NOAA C-CAP data provides land cover information, but does not include as much detail on the type of forest, shrub, or grassland cover (i.e. native vs. non-native) as does GAP.
Theme: Self-made data (n = 4)
Acquisition of remote sensing or photography for areas of interest for local interpretation
Generating our own refined data via remote sensing methodology
Not as functional, but I use straight aerial imagery most often to get a better idea of coverage.
Self-derived land cover data, typically from Landsat or ASTER. We do this only for small areas, not statewide.
Theme: United States Department of Agriculture data (n = 4)
FSA imagery (Farm Service Agency)
USDA
USDA agriculture data
USDA Landcover data
Theme: United States Forest Service data (n = 4)
FIA LULC (Forest Inventory and Analysis)
US Forest Service
USFS Corporate Vegetation data
We once used some data from the Forest Service that as I recall was land cover. 5+ years ago, so I'm a bit fuzzy. I don't know if the FS sends their data to our GAP office here in town, or not.
Theme: National Park Service data (n = 3)

NPS Veg Mapping Program
NPS Vegetation Inventory and Mapping
NPS vegetation mapping.
Theme: United States Fish and Wildlife Service - National Wetlands Inventory (n = 3)
NWI (3)
Theme: Combined data (n = 3)
Compilations of GAP and landfire
LandFire/NatureServe National Map
NatureServe integrated map of merged Landfire and Gap with editing from heritage and NatureServe ecologists
Theme: Soil maps (n = 2)
Old soil/veg surveys
Soils maps
Theme: Multiple datasets (n = 2)
Multiple alternatives must be looked at in aggregate to supplement GAP data.
Regional and state and local data sets
Theme: United States Geological Survey data (n = 2)
SageMap
USGS seamless server
Theme: Alternatives are limited (n = 2)
Integrated Landscape Assessement Data and GNN Data, available for the SW and NW. There are NO alternatives nationally.
Only for select areas, data from Natural Heritage New Mexico. GAP provides the only statewide coverage for landcover at the 30 m scale.
Theme: Don't know (n = 2)
Ummmm...can't think of it right now, but I know I've used at least one other land cover data source
Unsure of source (State of Florida, FL Natural Areas Inventory, TNC?)
Theme: No opinion (n = 2)
I do not use GAP data and do not have an opinion
The fire program uses it, I don't.
No theme:
NVCP in the national parks
Agency GIS coverages
Data from the Joint Ventures
Developed by researchers in LTER program. (Long Term Ecological Research Network)
Google Earth
Integrated Landscape Assessment Project
LandSAT
LEAF, OGE
Local surveys by the USFWS but they are not at the geographic scale of GAP
NatureServe
SFWS Refuge Mapping
Synthmap
University of Arizona

Q58 How would you grade the current performance of GAP on mapping the land cover of the United States? (*n* = 107, average = 3)

a. A (4)	**b. B (3)**	c. C (2)	d. D (1)	e. F (0)	f. I don't have enough knowledge to grade this item (no value)
8%	**44%**	12%	2%		35%

The respondents who completed the questions regarding land-cover data were next directed to Q108.

Predicted Species Distribution Data

Q59 GAP predicted species distribution datasets are useful at the following levels (select all that apply). (*n* = 65)

Response	Number of times selected	Percent
a. National	31	48
b. Regional	39	60
c. Ecosystem	35	54
d. State	**51**	**78**
e. County	27	42
f. Refuge	12	18
g. Other: [open-ended response]	4	6
Watershed		
Regions with a state (i.e., multiple counties)		
Municipality		
Global		

Q60 GAP predicted species distribution datasets are necessary at the following levels (select all that apply). (*n* = 64)

Response	Number of times selected	Percent
a. National	37	58
b. Regional	45	70
c. Ecosystem	40	63
d. State	**47**	**73**
e. County	32	50
f. Refuge	18	28
g. Other: [open-ended response]	4	6
Watershed		
Municipality		
Global		
Depends on the taxa		

Q61 How important is it to have consistent seamless national coverage of predicted species distribution data? (*n* = 65, average = 4)

a. Not important (1)	b. Slightly important (2)	c. Important (3)	**d. Very important (4)**	e. Critical (5)
5%	11%	25%	**39%**	22%

Q62 How frequently should GAP predicted species distribution data be produced? (*n* = 64)

Response	Percent
a. Yearly	5
b. Every 2–4 years	19
c. Every 5–7 years	**36**
d. Every 8–10 years	**36**
e. Other: [open-ended response]	5
Occasionally	
In regions where there is significant change, every 2-3 years. In other areas, the frequency could be longer.	
10-15 y	

Q63 It is more useful to me for species to be modeled on biological range rather than along state boundaries. (*n* = 64, average = 4)

a. Strongly disagree (1)	b. Somewhat disagree (2)	c. Neither agree nor disagree (3)	d. Somewhat agree (4)	**e. Strongly agree (5)**
2%	9%	11%	20%	**58%**

Q64 The select group of species modeled by GAP is appropriate for my use. (*n* = 63, average = 4)

a. Strongly disagree (1)	b. Somewhat disagree (2)	c. Neither agree nor disagree (3)	**d. Somewhat agree (4)**	e. Strongly agree (5)
	13%	14%	**44%**	29%

Q65 For my purposes, GAP predicted species distribution data are relevant. (*n* = 64, average = 4)

a. Strongly disagree (1)	b. Somewhat disagree (2)	c. Neither agree nor disagree (3)	d. Somewhat agree (4)	**e. Strongly agree (5)**
	5%	9%	42%	**44%**

Q66 I believe that GAP predicted species distribution data are reliable. Reliable data are accurate, complete, dependable, and consistent. (*n* = 64, average = 4)

a. Strongly disagree (1)	b. Somewhat disagree (2)	c. Neither agree nor disagree (3)	**d. Somewhat agree (4)**	e. Strongly agree (5)
5%	17%	14%	**52%**	13%

Q67 Appropriate processes were used to assemble GAP predicted species distribution data. (*n* = 64, average = 4)

a. Strongly disagree (1)	b. Somewhat disagree (2)	c. Neither agree nor disagree (3)	**d. Somewhat agree (4)**	e. Strongly agree (5)
2%	8%	20%	**41%**	30%

Q68 GAP predicted species distribution data are sufficiently current for my use. (*n* = 64, average = 4)

a. Strongly disagree	b. Somewhat disagree	c. Neither agree nor disagree	**d. Somewhat agree**	e. Strongly agree
(1)	(2)	(3)	**(4)**	(5)
8%	16%	16%	**36%**	25%

Q69 The appropriate set of GAP predicted species distribution data was available when I needed it. (*n* = 54, average = 4)

a. Strongly disagree	b. Somewhat disagree	c. Neither agree nor disagree	**d. Somewhat agree**	e. Strongly agree
(1)	(2)	(3)	**(4)**	(5)
3%	11%	17%	**36%**	33%

Q70 GAP predicted species distribution data are the best available data. (*n* = 62, average = 3)

a. Strongly disagree	b. Somewhat disagree	c. Neither agree nor disagree	**d. Somewhat agree**	e. Strongly agree
(1)	(2)	(3)	**(4)**	(5)
11%	10%	21%	**37%**	21%

Q71 GAP predicted species distribution data are easy to use with other datasets. (*n* = 63, average = 4)

a. Strongly disagree	b. Somewhat disagree	c. Neither agree nor disagree	**d. Somewhat agree**	e. Strongly agree
(1)	(2)	(3)	**(4)**	(5)
	5%	27%	**49%**	19%

Q72 GAP predicted species distribution data are developed through cooperation with stakeholders (potential users of data). (*n* = 64, average = 4)

a. Strongly disagree	b. Somewhat disagree	c. Neither agree nor disagree	d. Somewhat agree	**e. Strongly agree**
(1)	(2)	(3)	(4)	**(5)**
2%	6%	30%	28%	**34%**

Q73 GAP has a biologically meaningful rationale for defining the species to be modeled. (*n* = 64, average = 4)

a. Strongly disagree	b. Somewhat disagree	c. Neither agree nor disagree	**d. Somewhat agree**	e. Strongly agree
(1)	(2)	(3)	**(4)**	(5)
2%	2%	28%	**42%**	27%

Q74 It is easy for me to access the GAP predicted species distribution data I need. (*n* = 64, average = 4)

a. Strongly disagree	b. Somewhat disagree	c. Neither agree nor disagree	**d. Somewhat agree**	e. Strongly agree
(1)	(2)	(3)	**(4)**	(5)
3%	14%	19%	**34%**	30%

Q75 GAP predicted species distribution data are sufficiently complete for my intended uses. (*n* = 64, average = 3)

a. Strongly disagree	b. Somewhat disagree	c. Neither agree nor disagree	**d. Somewhat agree**	e. Strongly agree
(1)	(2)	(3)	**(4)**	(5)
9%	16%	20%	**36%**	19%

Q76 Previous GAP projects used deductive modeling—based on expert input on habitat associations—for predicted species distributions. The Northwest Regional GAP project added inductive modeling—based on species occurrences, climatic data input, and statistical algorithms. To what extent will this change from deductive to inductive modeling improve GAP predicted species modeling? (*n* = 63, average = 2)

a. No improvement (1)	b. Slight improvement (2)	c. Moderate improvement (3)	d. Great improvement (4)	**e. Cannot judge (no value)**
3%	6%	24%	21%	**46%**

Q77 The selection of species to be modeled should be based on: (check one) (*n* = 63)

Response	Percent
a. A hierarchical spatial model with widely occurring species being mapped more coarsely and species dependent on small habitat patches being mapped more finely	**33**
b. The species that are known to be modeled well with the current modeling approach used by GAP	6
c. The species that were previously identified as GAP species	8
d. Species that can be used as indicator, umbrella or keystone species	18
e. Species that are most sensitive to biological stressors such as climate change, invasive species, and habitat fragmentation	22
f. Other: [open-ended response].	13
Theme: All species (n =4)	
Use all, no selection	
All species should be modeled.	
All species	
All species were modeled when feasible. It depends on goals.	
No theme:	
Too difficult to select just one. Species identified as important by management in key regions.	
Species for which model demand is high	
Based on the adequacy of occurrences	
I can't answer this question	

Q78 At what level would you assess the quality of GAP predicted species distribution data? (*n* = 63, average = 3)

a. Very low (1)	b. Low (2)	**c. Medium (3)**	d. High (4)	e. Very high (5)
	11%	**44%**	41%	3%

Q79 To what extent do GAP predicted species distribution data meet your expectations? (*n* = 64, average = 3)

a. Not at all (1)	b. Meets some expectations (2)	**c. Meets most expectations (3)**	d. Meets all expectations (4)
	41%	**58%**	2%

Q80 In your opinion, what one type of information or feature could be added to GAP predicted species distribution data to make the data more useful? [open-ended response] (*n* = 36)

Several respondents made multiple comments. If a respondent made multiple comments, the comments were split into independent components before the responses were summarized.

Response
Theme: Add information (n = 9)

	Scenarios with climate change options such as used in Cal-Adapt protocol
	Museum records
	Inundation of sea level rise at intervals of .5m, 1m, 1.5m, 2.0m; flood inundation models, predictive changes in species ranges with climate change
	Incorporate Geology or soils in the predicted veg cover layer
	In the modeling, have minimal key requirements for species. For example, digitized soil data is necessary for accurate modeling of many fossorial species.
	Climate Change data
	At some point, we need more than presence/absence. Predicted distribution of abudance, productivity, usage may be needed. For instance, users want to know which area is more preferred/optimal and which area is marginal.
	An overlay with known points of occurrence is always instructive.
	Additional spatial covariates
Theme: No opinion (n = 5)	
	Not sure - modeling is a very complex process.
	Not sure
	No ideas at this time
	I don't know.
	Have not used recently enough to comment
Theme: Verification (n = 4)	
	Where applicable, GAP's species distribution models could be verified with Heritage Program's "element occurrence" datasets (or NatureServe's data) to check if occurrences confirm what the models predicted.
	Make sure underlying data used to determine model is collected during the period when the underlying landcover accurately defined the areas utilized by the species. Many species use ephemeral habitats and changes in landuse and succession can drastically alter species distributions such that predicted models may place species in habitats that no longer occur (e.g. early successional habitats).
	Field verification sample size
	Confirmed locality records
Theme: Species distributions (n = 4)	
	Species range through habitats
	I think that the type of modeling does not adequately describe many species distributions and using statistical approach that includes species occurrence data is an important step
	Ecological scale of species
	Distribution of species into the climatic regions.
Theme: Continuous refinement (n = 3)	
	Continuous refinement.
	Sustained maintenance and updated information based on on-going data gathering and integration from multiple sources
	Continue to consult state biologists and other experts to obtain good GAP data and to review draft models. I realize this has significant costs associated.
Theme: Update (n = 2)	
	Recent updates for California
	GAP data for Iowa and the rest of the Midwest needs to be updated; 1992 landcover data is not reflective of current reality and thus predictive models based upon that are outdated too.
Theme: Source data (n = 2)	
	Sources used
	Dig deeper for source data (current species range, etc.) rather than just rely on web.
Theme: Improve accuracy (n = 2)	

Work with the state wildlife agency to determine if the models are accurate - we've improved them!
The inclusion of SSURGO-level soil map units in updated models would improve model accuracy for some species.
Theme: Fine scale (n = 2)
Fine-scale models for some species in particular sites
Fine scale modeling
Theme: Ease of use (n = 2)
Online mapping access
Allow user to define extent (i.e., state, region, etc.)
Theme: Availability of error/accuracy information (n = 2)
Some value of certainty that incorporates both the uncertainty of the underlying spatial information, and the species-habitat relationships. "Best available" cannot substitute for quantifiable uncertainty when applying this information to decision making.
Accuracy assessment for each model would be helpful. A simple evaluation of errors of omission and comission for example using some observation data gathered from state wildlife agencies, natural heritage programs, or other survey efforts such as BBS or eBird.
No theme:
Moving towards point data and prediction grids, leave the deductive models apart (unless shown to be useful), add metadata, link with GBIF
Most of my work pertains to quantitative habitat suitability modeling in estuaries. There is no Aquatic GAP program for the marine environment that I am aware of. I model species abundances using zero inflated models. A basic problem with modeling estuarine and/or coastal habitats is sediment mapping. I have worked with [name deleted] who used dbSEABED data from USGS to map sediments on the West Florida shelf. This is a good use of USGS datasets (although I am not sure they are considered GAP data).
I'm pretty concerned at the way this series of questions characterizes prior versions of GAP and the most current version. I don't agree with the characterization. The most recent version suffers from severely pixelized predicted distributions, to the extent of being of limited utility, in my opinion, and I've never thought it accurate to portray distributions as a million little disjunct dots. Very strange product.
Incorporation of existing data sets as optional add-on component
Finer resolution

Q81 Are there alternative sources for the information provided in GAP predicted species distribution data—similar data but from a different source? (*n* = 64)

Response	Percent
a. Yes	42
b. No	**58**

If respondents indicated there were alternative sources in Q81, they were asked to name the primary alternative (Q82). If respondents answered "No" to Q81, they were directed next to Q83.

Q82 Name the primary alternative to GAP predicted species distribution data. [open-ended response] (*n* = 22)

If a respondent made multiple comments, the comments were split into independent components before the responses were summarized.

Response
Theme: State (n = 4)
State Wildlife Agency data
State produced products
State game and fish atlas data
Specific research projects or state agencies sometimes model species distributions; this tends to occur at smaller

spatial scales.
Theme: Other online source (n = 4)
NDIS [Natural Diversity Information Source]
GBIF, OBIS, MANIS, eBIRD etc
Online zoology websites
Digital herbarium location datasets
Theme: Breeding Bird Survey (n = 3)
Breeding Bird Survey data
Breeding Bird Atlases
BBS data (and similar)
Theme: Other agencies (n = 3)
Other distribution studies, US Forest Service
Individual models based on interagency collaboratively developed modeling efforts
National and state park vegetation data sets, etc.
Theme: NatureServe (n = 2)
NatureServe (2)
Theme: University (n = 2)
University studies
UMass is working with the USFWS Region 5 and partners to create predictive models for representative species (umbrella, keystone species) in pilot areas within the northeast. The purpose is to assess the capability of current and potential future landscapes in the northeast to provide integral ecosystems and suitable habitat for a suite of representative species, and provide guidance for strategic habitat conservation. These models show how species may respond under anticipated future changes (i.e., climate change, development). I am not familiar with how these models are being developed...UMass may be using GAP data...These models are still in the development stage.
Theme: Local (n = 2)
Site inventory, local knowledge.
Various county-level vegetation data sets
Theme: Develop own (n = 2)
Develop my own species distribution models from the GAP species occurrence data and environmental covariates.
My own empircal models.
No theme:
I don't have an alternative -need to change my previous answer and can't.
Deductive and inductive models developed by various other parties (but these are not uniformly available)
Calveg (my program of vegetation mapping) at the mid-scale of spatial resolution
Actual records based on musuem data
Actual distribution data
California Native Plant Society vegetation mapping at the finer scale

Q83 How would you grade the current performance of GAP on mapping the predicted distributions of vertebrate species for the United States? (*n* = 64, average = 3)

a. A (4)	b. B (3)	c. C (2)	d. D (1)	e. F (0)	**f. I don't have enough knowledge to grade this item (no value)**
13%	38%	8%	3%		**39%**

The respondents who completed the questions regarding predicted species distribution data were next directed to Q108.

Stewardship/Protected Areas Data

Q84 GAP stewardship/protected areas datasets are useful at the following levels (select all that apply): (*n* = 28)

Response	Number of times selected	Percent
a. National	19	68
b. Regional	18	64
c. Ecosystem	17	61
d. State	**21**	**75**
e. County	13	46
f. Refuge	2	7
g. Other: [open-ended response]	5	18
HUC 8 Watershed		
Great Lakes		
Depends on application		
None, they are outdated.		

Q85 GAP stewardship/protected areas datasets are necessary at the following levels (select all that apply): (*n* = 28)

Response	Number of times selected	Percent
a. National	19	68
b. Regional	17	61
c. Ecosystem	16	57
d. State	**21**	**75**
e. County	18	64
f. Refuge	3	11
g. Other: [open-ended response]	4	14
HUC 8 Watershed		
Great Lakes		
Depends on application		

Q86 How important is it to have consistent seamless national coverage of stewardship/protected areas? (*n* = 29, average = 4)

a. Not important (1)	b. Slightly important (2)	c. Important (3)	**d. Very important (4)**	e. Critical (5)
3%	10%	21%	**35%**	31%

Q87 How frequently should GAP stewardship/protected areas data be produced? (*n* = 29)

Response	Percent
a. Yearly	35
b. Every 2–4 years	**41**
c. Every 5–7 years	17
d. Every 8–10 years	

e. Other: [open-ended response]	7
Not Sure	
Every 5 years in-line with national NLCD and census.	

Q88 Incorporating the United Nations Environment Programme's World Commission on Protected Areas IUCN (International Union for Conservation of Nature) codes is a great improvement. (*n* = 27, average = 4)

a. Strongly disagree (1)	b. Somewhat disagree (2)	c. Neither agree nor disagree (3)	d. Somewhat agree (4)	**e. Strongly agree (5)**
4%	7%	30%	26%	**33%**

Q89 For my purposes, GAP stewardship/protected areas data are relevant. (*n* = 27, average = 4)

a. Strongly disagree (1)	b. Somewhat disagree (2)	c. Neither agree nor disagree (3)	d. Somewhat agree (4)	**e. Strongly agree (5)**
		19%	26%	**56%**

Q90 I believe that GAP stewardship/protected areas data are reliable. Reliable data are accurate, complete, dependable, and consistent. (*n* = 27, average = 4)

a. Strongly disagree (1)	b. Somewhat disagree (2)	c. Neither agree nor disagree (3)	**d. Somewhat agree (4)**	e. Strongly agree (5)
4%	11%	26%	**37%**	22%

Q91 Appropriate processes were used to assemble GAP stewardship/protected areas data. (*n* = 27, average = 4)

a. Strongly disagree (1)	b. Somewhat disagree (2)	c. Neither agree nor disagree (3)	**d. Somewhat agree (4)**	e. Strongly agree (5)
		26%	**41%**	33%

Q92 GAP stewardship/protected areas data are sufficiently current for my use. (*n* = 27, average = 3)

a. Strongly disagree (1)	b. Somewhat disagree (2)	c. Neither agree nor disagree (3)	**d. Somewhat agree (4)**	e. Strongly agree (5)
11%	15%	19%	**30%**	26%

Q93 The appropriate set of GAP stewardship/protected areas data was available when I needed it. (*n* = 27, average = 4)

a. Strongly disagree (1)	b. Somewhat disagree (2)	c. Neither agree nor disagree (3)	**d. Somewhat agree (4)**	**e. Strongly agree (5)**
7%	7%	19%	**33%**	**33%**

Q94 GAP stewardship/protected areas data are the best available data of that type. (*n* = 27, average = 3)

a. Strongly disagree (1)	b. Somewhat disagree (2)	**c. Neither agree nor disagree (3)**	d. Somewhat agree (4)	e. Strongly agree (5)
11%	11%	**41%**	15%	22%

Q95 GAP stewardship/protected areas data are easy to use with other datasets. (*n* = 27, average = 4)

a. Strongly disagree (1)	b. Somewhat disagree (2)	c. Neither agree nor disagree (3)	d. Somewhat agree (4)	**e. Strongly agree (5)**
4%		22%	33%	**41%**

Q96 GAP stewardship/protected areas data are developed through cooperation with stakeholders (potential users of data). (*n* = 27, average = 4)

a. Strongly disagree (1)	b. Somewhat disagree (2)	c. Neither agree nor disagree (3)	**d. Somewhat agree (4)**	e. Strongly agree (5)
4%		22%	**44%**	30%

Q97 It is easy for me to access the GAP stewardship/protected areas data I need. (*n* = 27, average = 4)

a. Strongly disagree (1)	b. Somewhat disagree (2)	c. Neither agree nor disagree (3)	d. Somewhat agree (4)	**e. Strongly agree (5)**
7%		19%	30%	**44%**

Q98 GAP stewardship/protected areas data are sufficiently complete for my intended uses. (*n* = 27, average = 3)

a. Strongly disagree (1)	b. Somewhat disagree (2)	c. Neither agree nor disagree (3)	**d. Somewhat agree (4)**	**e. Strongly agree (5)**
7%	22%	19%	**26%**	**26%**

Q99 At what level would you assess the quality of GAP stewardship/protected areas data? (*n* = 27, average = 3)

a. Very low (1)	b. Low (2)	c. Medium (3)	**d. High (4)**	e. Very high (5)
7%	4%	26%	**59%**	4%

Q100 To what extent do GAP stewardship/protected areas data meet your expectations? (*n* = 27, average = 3)

a. Not at all (1)	b. Meets some expectations (2)	**c. Meets most expectations (3)**	d. Meets all expectations (4)
7%	30%	**48%**	15%

Q101 In your opinion, what one type of information or feature could be added to GAP stewardship/protected areas data to make the data more useful? [open-ended response] (*n* = 13)

Several respondents made multiple comments. If a respondent made multiple comments, the comments were split into independent components before the responses were summarized.

Response
Theme: Add information (n = 4)
Record level metadata showing time-sequenced annexations for each area.
Measures of effectiveness (e.g., levels of impact inside vs. outside of PA)
Biodiversity protection intent
Links to source data
Theme: Date information (n = 3)
Year that land became protected
Date of establishment (maybe you have added already)

Data date for an individual record
Theme: Update (n = 3)
Up to date conservation easement data
More frequent updates
Update the data.
Theme: Local data (n = 2)
Local level data needs to be incorporated into the national dataset.
Local (city, county, land trust) protected areas
No theme:
Tutorial about how to use GAP
Increase consistency of local protected areas.
Higher resolution
One consistent ranking scheme (e.g. gap status or IUCN, but some protected areas are still unranked. This makes it difficult to use consistently at a national scale).

Q102 Are there alternative sources for the information provided in GAP stewardship/protected areas data—similar data but from a different source? (*n* = 28)

Response	Percent
a. Yes	**75**
b. No	25

If respondents indicated there were alternative sources in Q102, they were asked to name the primary alternative (Q103). If respondents answered "No" to Q102, they were directed next to Q104. If a respondent made multiple comments, the comments were split into independent components before the responses were summarized.

Q103 Name the primary alternative to GAP stewardship/protected areas data. [open-ended response] (*n* = 19)

Response
Theme: State (n = 8)
States
State-created ownership data and/or individual agency datasets
State maintained databases
State Agency
Individual state agencies and NGOs
In VT Conserved Lands Database
For Colorado there is COMaP which is better at the state level.
Individual state by state databases (which are often updated more frequently).
Theme: Non-Governmental Organization (NGO) (n = 7)
Ducks Unlimited took Gap data and made it more current-- so I'd use that one, because Ohio's stewardship is 10 years old (technology changes, parcels change)
CBI's [Conservation Biology Institute] protected areas database
The Nature Conservancy's Boston Office assembles this data layer for use within TNC and I think provides this layer to USGS.
NGO data
IUCN data on its own.
http://conservationeasement.us/

WDPA [World Database on Protected Areas]
Theme: Local (n = 2)
Our own (Pima County) dataset.
Local agency, county and LGU land records data
Theme: Federal Agency (n = 7)
NOAA C-CAP
Federal agency data
No theme:
The data that I create as part of my job
Strittholt's database
Conservation partners.
Managed Areas Database from UCSB.

Q104 How would you grade the current performance of GAP on documenting the representation of land ownership and protection (mapping stewardship/protected areas) in the United States? (*n* = 27)

a. A (4)	b. B (3)	c. C (2)	d. D (1)	e. F (0)	**f. I don't have enough knowledge to grade this item (no value)**
15%	33%	7%	4%		**41%**

The respondents who completed the questions regarding stewardship/protected areas data were next directed to Q108.

Analysis Data

Q105 GAP analysis data, which combines land-cover, predicted species distribution, and stewardship/protected areas data, are sufficiently complete for my intended uses. (*n* = 32, average = 3)

a. Strongly disagree (1)	b. Somewhat disagree (2)	c. Neither agree nor disagree (3)	**d. Somewhat agree (4)**	e. Strongly agree (5)
6%	22%	28%	**41%**	3%

Q106 Are there alternative sources for the information provided in GAP analysis data—similar data but from a different source? (*n* = 32)

Response	Percent
a. Yes	**63**
b. No	38

If respondents indicated there were alternative sources in Q106, they were asked to name the primary alternative (Q107). If respondents answered "No" to Q106, they were directed next to Q108. If a respondent made multiple comments, the comments were split into independent components before the responses were summarized.

Q107 Name the primary alternative to GAP analysis (land cover + predicted species + stewardship/protected areas) data. [open-ended response] (*n* = 17)

Response
Theme: Multiple (n = 5)

National Landcover Dataset; LandFIRE; Protected Areas Database; NatureServe species distributions; model-based user-generated models of species occurrence and abundance
National Fish Habitat Action plan NHDPlus, Regional projects
Landfire for landcover, heritage programs for predicted species, state/NGOs for stewardship.
Landscape Conservation Cooperative, Representative Species data sets
CBI PAD, other land cover mapping (e.g., CCAP, NWI, region specific mapping like LCREP Lower Columbia River mapping), other predicted species and/or critical habitat
Theme: Landcover (n = 3)
This response only pertains to landcover data: NLCD and NOAA Coastal landcover data
National Land Cover Database
LANDFIRE, NLCD
Theme: State (n = 2)
State of Michigan data layers.
State data sets
Theme: University (n = 2)
Individual research projects at a university
Different research work done by universities using GIS.
No theme:
State and federal agencies GIS database
Species range models
Natural Heritage Data Base
In-house data and analysis
Expert elicitation (BBN) or nation-wide survey data (BBS).

Benefits of Using GAP Data

Q108 I intend to continue to use existing GAP data. (*n* = 289, average = 4)

a. Strongly disagree (1)	b. Somewhat disagree (2)	c. Neither agree nor disagree (3)	d. Somewhat agree (4)	**e. Strongly agree (5)**
8%	6%	17%	31%	**38%**

Q109 To what extent are GAP data compatible with other datasets that you use? (*n* = 291, average = 3)

a. Not at all compatible (1)	b. Somewhat compatible (2)	**c. Moderately compatible (3)**	**d. Very compatible (4)**
1%	32%	**33%**	**33%**

If respondents indicated that GAP data were not compatible, they were next directed to Q110 for a follow-up question. If respondents indicated that GAP data were compatible with other data to any degree, they were directed to Q111.

Q110 In what way are GAP data not compatible? (*n* = 4)

Response	Percent
a. Resolution	**50**
b. Format	
c. Content	
d. Software incompatibility	
e. Other: [open-ended response]	50
I used it for a past job.	
I do not use GAP data and do not have an opinion	

Q111 To what extent does using GAP data improve your capacity to impact conservation of biodiversity? (*n* = 289)

Response	Percent
a. I don't work directly on conservation of biodiversity	16
b. Not at all	2
c. Somewhat	18
d. Moderately	28
e. Substantially	**30**
f. Use of GAP data maximizes my capacity.	5

Q112 Use of GAP data helps my organization achieve its conservation related goals. (*n* = 287, average = 4)

My organization doesn't have conservation related goals (no value)	a. Strongly disagree (1)	b. Somewhat disagree (2)	c. Neither agree nor disagree (3)	**d. Somewhat agree (4)**	e. Strongly agree (5)
8%	1%	6%	18%	**38%**	28%

Q113 To what extent has use of GAP data improved your communication of information to others involved in conservation of biodiversity? (*n* = 284, average = 3)

a. Not at all (1)	b. Somewhat (2)	**c. Moderately (3)**	d. Substantially (4)
12%	30%	**34%**	25%

Q114 To what extent does/did use of GAP data increase your productivity? (*n* = 284, average = 3)

a. No increase in productivity (1)	b. Slight increase in productivity (2)	**c. Moderate increase in productivity (3)**	d. Large increase in productivity (4)	e. Extreme increase in productivity (5)
16%	20%	**39%**	22%	3%

Q115 By using GAP data did your organization experience any of the following benefits?

Benefits:	Percent Yes	Percent No
a. By using GAP data did your organization experience monetary savings? (*n* = 277)	49	**51**
b. By using GAP data did your organization experience time savings? (*n* = 276)	**69**	31
c. By using GAP data did your organization experience improved efficiency in the work process? (*n* = 277)	**71**	29

d. By using GAP data did your organization experience improved effectiveness? (*n* = 275)	**77**	23
e. By using GAP data did your organization experience improved decisions? (*n* = 289)	**72**	28
f. If there are benefits, other than the ones named above, that your organization experienced as the result of using GAP data, please name them here. [open-ended response] (*n* = 58)		
Theme: Description of how GAP data were used (n = 8)		
GAP data were used in all phases of the resource management planning document.		
GAP data was included in our State Wildlife Action Plan to provide a baseline of data.		
Computing the amount of forest nationwide		
Using landcover as color maps to drive 3D ecosystem placement/growth as accurately as possible given the relatively coarse resolution it is provided as.		
Some states used GAP date in wildlife action plans. Helped them select and map habitat priorities for conservation.		
We incorporated GAP data into our HabiMap Arizona conservation planning tool. Many of these questions are hard to answer but this tool has the potential to dramatically change land use planning in AZ		
It adds to the Commonwealth's spatial data infrastructure. A "must" layer in a state with over 90% of land in private hands...		
GAP data really help us understand land-use change at the County scale. No other products helped us the way GAP has		
Theme: Not using GAP now (n = 7)		
Since I am not involved with use of GAP data at this moment, I can't answer the above questions.		
Not using GAP data at this moment.		
It's been like 5-8 years since I've used these data		
I don't think we are using GAP		
We haven't used GAP data, plan to use it if it fits our accuracy standards.		
Since current GAP data were not available for the Northeast our organization sought other data sources.		
Clark County is using its own current (2011) Vegetation data layer but could use an updated version in a couple of years from now		
Theme: Useful in education (n = 4)		
Useful in an educational setting for conservation biology		
Improved educational value to the public		
Good teaching resource.		
We use this dataset to teach GIS - it is an example of how much data/insight can come from one shapefile.		
Theme: Credibility (n = 4)		
Improved the authoritativeness of the conclusions		
Authoritative data sets improve the credibility of products		
Citing a USGS project provides validation when using this data in certain regional-local green infrastructure or regional planning projects.		
When two datasets agree, such as GAP and LandFire, it increases my confidence.		
Theme: Communication (n = 4)		
Improved communication with the public.		
Communication of complexity		
Greatly improved communication with partners		
Overall understanding of and ability to communicate statewide vegetation patterns		
Theme: Don't know (n = 4)		
Unknown		
I would have preferred to not answer the last question about "improved decisions" because there really is no way to		

judge that - but the survey made me select one. Please disregard that answer.
I am not fully aware of the use of GAP data by my organization. I assume it is being used by our GIS group (at another location than mine). A land-use land cover map was created for all of Florida. Further analyses has been done on streams and lakes that can support mapping species distributions in freshwater (aquatic GAP). Agency policy is to conserve biodiversity within various biomes/ecosystems. So, GAP has the potential to support these goals. But, I do not know to what extent it is being applied or how closely my agency collaborates with USGS to achieve these goals using GIS.
I don't know.
Theme: Improved accuracy (n = 3)
Improved scientific accuracy and power to analyze conservation scenarios.
Hopefully more accurate analysis results based on the detailed land cover data.
Helped to make more accurate decisions
Theme: None (n = 3)
No benefits to using GAP data. The data is not high enough of resolution to be productive. If you want some real vegetation data you pretty much have to find or create the data yourself. GAP data is not that useful except in a very broad regional scale.
None (2)
Theme: Used in absence of other data (n = 2)
There is no alternative to GAP data for New York so not using it would mean collecting our own and obviously increase cost, time, and decrease efficiency.
In absence of vegetation data, I used GAP in older mapping projects to enhance the effectiveness and possibly increase the accuracy of our maps for data-poor regions of the state.
Theme: Provides missing information (n = 2)
Fills in the GAPs in agency vegetation data due to other ownerships.
Filled in needed information at relatively low costs to inform decision-makers
Theme: Time savings (n = 2)
It is great to find such information all in one place. It saves a great amount of time to NOT to have to go to many organizations to try and acquire data.
Well, this is tough. Had I to make the data it would have taken years. Before it was available we had to assemble from multiple sources (e.g., TNC, states, local).
No theme:
We have learned an enormous amount about pattern and process in ecosystems, habitats and landscapes, and about conservation stewardship, because of investments in spatial data made through GAP. The program was a pioneer in its contributions to natural resource management and continues to be an essential contributor.
Standardization
Species habitat modeling helps to better understand and determine locations where a given species may potentially occur, particularly in the absence of site-specific occurrence records.
Research related benefits because of available digital high spatial resolution data
Research opportunity to examine land cover related questions, habitat use, etc.
My organization does planning and project management at a much finer scale
I can't speak to all of this...my understanding is that the use of GAP pushed forward my organization's goals and effectiveness for a significant period of time. Since the time I have been here (5 years) it has been needing an update.
GAP data provides good coarse scale analysis from which finer scale needs can be derived and developed. GAP provides a check to insure that areas are not overlooked or specific veg layers are not omitted in impact analyses and all important data is considered.
GAP data improve our organization’s overall integration in the science-based bird conservation community.
Better spatial management of landscapes and over time
Assisted us with updating our veg maps.

Ability to identify potential partners to collaborate with on other projects in regions of interest.
Ability to better work at regional scales
A current landcover dataset is necessary for what I routinely do. If one is not available, I must rely on one that is out of date or not completely appropriate for my purposes (which leads to inaccuracy in my work).
Used by other organizations that we work with

If the response to Q115e (Improved decisions) was "Yes," then the respondent was asked a follow-up question regarding the improved decisionmaking (Q116).

Q116 In what way(s) did use of GAP data improve decisionmaking?

	Percent Yes	Percent No
a. Provided necessary information (*n* = 201)	**98**	2
b. Reduced uncertainty about decision options (*n* = 198)	**77**	23
c. Products based on GAP data allowed for better visualization of decision options (*n* = 201)	**93**	7
d. Products based on GAP data allowed for identification of issues that were unforeseen at the beginning of the project (*n* = 196)	**62**	38
e. Other ways in which use of GAP data improved decisionmaking. [open-ended response] (*n* = 21)		
Theme: Communication (n = 2)		
Facilitated cross agency communication		
Communication, triggering new science and open access work +data discussions		
Theme: Don't know (n = 2)		
No others that I can think of at this moment		
I don't know		
Theme: None (n = 2)		
None (2)		
No theme:		
Wall to wall coverage		
Used species models for many species to look at biodiversity and choose among land use decisions		
Products, often in combination, provide key insights for investment in field data collection, making that costly enterprise far more targeted and efficient.		
Of course the GAP products do all of the above		
Identification of specific gaps in detailed data.		
Helped to identify areas of potential conservation significance when site-specific data were lacking.		
Has provided a check for some estimates about surrounding lands		
For conservation target areas		
Everyone has access to it so it can be independently analyzed.		
Drives 2D information into 3 dimensional representations		
Collaboration with land managers who do not maintain land cover inventory		
Can facilitate more strategic decisions.		
Assess value of surrogate species, validate expert-based models, link objectives and alternatives to estimate consequences of management.		
Allowed quantification of land cover		
Identified areas for additional landcover delineation		

Q117 The work of my organization would suffer if GAP data were no longer available. (*n* = 282, average = 4)

a. Strongly disagree (1)	b. Somewhat disagree (2)	c. Neither agree nor disagree (3)	**d. Somewhat agree (4)**	e. Strongly agree (5)
6%	10%	27%	**33%**	25%

Q118 If GAP data were no longer available, which of the following actions would your organization most likely take? (*n* = 281)

Response	Percent
a. I could switch to a readily available substitute dataset.	18
b. I would have to search for an acceptable replacement dataset.	**48**
c. Create the dataset ourselves	25
d. Other: [open-ended response]	8
Theme: Not an issue (n = 4)	
Not used in my current postion.	
Not mission critical at present	
No longer at an organization that requires GAP data	
It would not affect us as we don't use GAP data	
Theme: All of the above actions (n = 3)	
Some combination of all three above	
Likely all three here...	
Combination of above, with a lot of massaging of data	
Theme: State data (n = 2)	
MN DNR	
COMaP for Colorado but hosed outside of state boundaries	
No theme:	
We most likely just would do it as much as I might like to create the data set ourselves. The reality is that it most likely wouldn't happen	
We already have our own dataset	
Use air photos and common sense	
USDA	
Search for or create a dataset myself	
Re-do datasets	
Not sure	
ND GAP land cover is out of date, would be useful to have current land cover data	
If we couldn't afford to create the data set, we might just not have data we need to be effective.	
I would have to search for/use multiple data sets	
Continue to work locally and regionally for needed information	
Already have and are creating and looking for ther sources of data	

Q119 If GAP data were no longer available, how much would you have to pay to purchase a substitute dataset? (*n* = 276)

Response	Percent
a. Less than $10,000	25
b. $10,000–20,000	2

c. $20,001–50,000	1
d. $50,001–100,000	3
e. More than $100,000	6
f. Unknown – no readily available substitute	**62**

Q120 If GAP data were not available and you had to use alternate data, how much less effective would your products be that you now base on GAP data? (*n* = 270, average = 3)

a. Actually, the products would be more effective (1)	b. No change in effectiveness (2)	**c. Somewhat less effective (3)**	d. Moderately less effective (4)	e. Substantially less effective (5)
4%	22%	**26%**	24%	24%

GIS Software and Data Preferences

Q121 Which GIS software packages do you frequently use? (Select all that apply.) (*n* = 276)

When respondents named multiple software packages in the open-ended response option, each software package was counted separately in summarizing the responses.

Response	Number of times selected	Percent
a. ArcView	97	35
b. ArcGIS	**245**	**89**
c. Imagine	33	12
d. GRASS	6	2
e. ENVI	15	5
f. MapInfo	6	2
g. Manifold	2	1
h. Idrisi	5	2
i. Other: [open-ended response]	22	8
Theme: Quantum GIS (n = 9)		
Quantum GIS (5)		
QGIS (3)		
None - trying QGIS		
Theme: R (n = 3)		
R		
R (spatial modules)		
R package		
Theme: Consumer of GIS information (n = 3)		
Virtual Nature Studio, Eon Vue, 3D Max (not GIS, but consume GIS data)		
Not a GIS user, but information user from GIS professionals		
I am not GIS proficient, I use GAP information that is compiled by others who are proficient with GIS		
Theme: ArcMap (n = 2)		
ArcMap10		
ArcMap		
No theme:		
We have technical people who do the manipulation		

Not a frequent user of any		
Map Window		
I don't actually use; I work [for] our GIS specialist who uses ArcGIS		
GeoMaster		
eCognition		
ArcExplorer		
PostGIS		
PCI		
MicroImages Map and Image Processing System		
Various imagery		

Q122 Which GIS software packages do you have access to but only occasionally use? (Select all that apply.) (*n* = 186)

Response	Number of times selected	Percent
a. ArcView	66	35
b. ArcGIS	51	27
c. Imagine	**68**	**37**
d. GRASS	21	11
e. ENVI	41	22
f. MapInfo	16	9
g. Manifold	2	1
h. Idrisi	21	11
i. Other: [open-ended response]	18	10
Theme: Quantum GIS (n = 3)		
Quantum GIS		
QGIS (2)		
Theme: None (n = 3)		
Not even an occasional user now		
None (2)		
Theme: uDIG (n = 2)		
uDIG (2)		
No theme:		
Spring		
Same as above		
Random Forest		
Program R		
Not sure		
Global Mapper		
Geo Media		
eCognition		
Biotas		
Mapwindow		

Q123 Do you prefer to: (*n* = 276)

Response	Percent
a. Access Web-based GIS tools/datasets.	8
b. Download data for use in your GIS system.	**58**
c. I have equal preference for each of the above options.	34

Q124 When you are obtaining GIS data in general, which delivery option do you prefer? (*n* = 274)

Response	Percent
a. File Transfer Protocol (FTP)	26
b. Direct Download	**66**
c. Receive on CD-ROM, DVD, or external hard drive for large datasets	6
d. Other: [open-ended response]	3
Theme: No opinion (n = 2)	
No opinion	
It doesn't matter to me	
No theme:	
Map services	
I think our GIS guy likes FTP, but I'm not sure	
Feature data service, direct connect	
Depends on size of dataset	
All three	
ANYTHING BUT FTP - NO FTP!!!!! OUR NETWORK FOLKS DON"T ALLOW IT!!!	

Q125 In general when you download GIS raster data (GAP or other), which format do you most frequently use? (*n* = 249)

Response	Percent
a. ESRI GRID (Interchange format)	**56**
b. Geotiff	23
c. Spatial Data Transfer Standard (SDTS)	3
d. ERDAS .img	9
e. Other: [open-ended response]	10
Theme: Don't know (n = 7)	
Unknown (2)	
I don't know. (2)	
Don't know (2)	
I don't know..the default?	
Theme: Someone else does this (n = 3)	
Someone else in my office does this for us	
Not sure which he does	
I don't know. Done by GIS specialist	
Theme: Shapefile (n = 2)	
Shapefile and kml	
Shapefile	
Theme: Equal preference (n = 2)	
ESRI GRID and ERDAS .img equally	
Equally prefer Grid and GeoTiff, dependent upon what we are doing	

Theme: Don't download (n = 2)	
I don't usually download it.	
I don't generally download GIS data	
No theme:	
Usually access data directly from ArcSDE.	
Use GIS inhouse server	
NA	
GDAL/OGR imports to GRASS; generate GeoTIFFs; use in QGIS	
File geodatabase	
Any or all	

Q126 When you download GAP raster data, which format do you most frequently use? (*n* = 247)

Response	Percent
a. ESRI GRID (Interchange format)	**60**
b. Geotiff	15
c. ERDAS .img	9
d. Use all with roughly the same frequency	4
e. Use none of the above. I use other: [open-ended response]	13
Theme: Don't know (n = 7)	
Unknown (2)	
I don't know. (2)	
Don't know (2)	
I don't know..the default?	
Theme: Don't download (n = 5)	
I haven't downloaded anytime recently	
I don't need to download gap data	
I don't download it.	
I don't download GAP raster data	
I don't anymore	
Theme: Already have data (n = 3)	
Data I have access to now.	
Already had data.	
The GAP data on my computer which I helped create	
Theme: Vector data (n = 2)	
Vector data from website	
Usually use GAP data that is already in vector format	
No theme:	
Use GIS inhouse server	
Shapefile	
NA	
MN DNR core GIS library geodatabase	
I have only used GAP feature data, not rasters.	
GDAL/OGR imports to GRASS; generate GeoTIFFs; use in QGIS	
Convert to dissolved feature class polygon	
Someone else does the downloading for us	

Q127 How satisfied are you with the speed with which you can download GAP data? (*n* = 249, average = 4)

a. Completely dissatisfied (1)	b. Somewhat dissatisfied (2)	**c. Neither satisfied nor dissatisfied (3)**	d. Somewhat satisfied (4)	e. Completely satisfied (5)
1%	5%	**43%**	32%	20%

Learning to Use GAP Data

Q128 How difficult was it for you to use GAP data the first time you used it? (*n* = 270, average = 3)

a. Very difficult (1)	b. Somewhat difficult (2)	**c. Neither difficult nor easy (3)**	d. Somewhat easy (4)	e. Very easy (5)
5%	25%	**36%**	20%	14%

Q129 If you had a question about using GAP data, what would your most likely course of action be? (*n* = 274)

Response	Percent
a. Go online to the GAP web site to find information	**41**
b. Go online to the GAP web site to use one of the online data viewers	4
c. Go online but not to the GAP web site. I'd search for other GAP users	2
d. Contact someone I know who has previously used GAP	21
e. Contact someone I know who worked on a GAP project	12
f. Contact a current GAP staff member	9
g. Contact someone I know who has GIS knowledge	7
h. Other: [open-ended response]	4
Theme: Metadata (n = 4)	
Read the metadata	
Read the included metadata, which I would have downloaded at the same time if it wasn't packaged together. See, at least one person does!	
Metadata, ask around and call GAP	
Consult the metadata first. Then go online. Then contact someone I know with GAP experience.	
No theme:	
Talk to myself - I was the PI for a state project.	
I would use a combination of the first, fourth, and fifth options.	
Google the question	
Could be any of the above	
Ask district GIS staff	
We have our own in-house copy of the data. National website/FTP server kept changing making it difficult for others to locate the data.	

Q130 How valuable would training on the use of GAP data be to you? (*n* = 282, average = 2)

a. Not at all valuable (1)	**b. Somewhat valuable (2)**	c. Moderately valuable (3)	d. Very valuable (4)
25%	**52%**	13%	10%

If respondents indicated that training on the use of GAP data would be valuable (any response to Q130 other than "Not at all valuable"), they were directed to Q131. If respondents indicated the training would not be at all valuable, then they were directed next to Q137.

Q131 How much would you be willing to pay, if necessary, for course registration for a one day training course on using GAP data? (*n* = 203)

Response	Percent
a. Only a negligible amount, definitely less than $100	**43**
b. $100–200	37
c. $201–300	6
d. $301–400	3
e. $401–500	2
f. Over $500	
g. I would not be willing to pay any amount.	8

Q132 How valuable would training on the use of GIS data as a tool for conservation decisionmaking (that used GAP data as an example) be to you? (*n* = 204, average = 2)

a. Not at all valuable (1)	**b. Somewhat valuable (2)**	c. Moderately valuable (3)	d. Very valuable (4)
16%	**50%**	18%	17%

Q133 How much would you be willing to pay, if necessary, for course registration for a one day training course on GIS data as a tool for conservation decisionmaking that used GAP data as an example? (*n* = 202)

Response	Percent
a. Only a negligible amount, definitely less than $100	**39**
b. $100–200	34
c. $201–300	8
d. $301–400	4
e. $401–500	2
f. Over $500	1
g. I would not be willing to pay any amount.	14

Q134 If you were to attend training on use of GAP data, what would be your preference for length of training? (*n* = 207)

a. ½ day	**b. 1 day**	c. 2 days	d. I would not attend training
11%	**69%**	15%	5%

Q135 In your opinion, which of the following would be the most effective training method (for best learning) on the use of GAP data? (*n* = 207)

Response	Percent
a. Training session—Instructor led classroom	**54**
b. Training session—Instructor led web-based	22
c. Training session held in conjunction with a conference	9
d. Online tutorial	12
e. Online Help desk—questions would be responded to by a member of the GAP staff	3

Q136 Which of the following would be the most practical training method (training that could be completed within the realistic constraints of time and budget) on the use of GAP data? (*n* = 204)

Response	Percent
a. Training session—Instructor led classroom	13
b. Training session—Instructor led web-based	**40**
c. Training session held in conjunction with a conference	13
d. Online tutorial	33
e. Online Help desk—questions would be responded to by a member of the GAP staff	2

Q137 How satisfied are you with the support you have received from GAP staff in your use of GAP data? (*n* = 143, average = 4)

I have never received any support from GAP staff (no value)	a. Completely dissatisfied (1)	b. Somewhat dissatisfied (2)	c. Neither dissatisfied nor satisfied (3)	d. Somewhat satisfied (4)	e. Completely satisfied (5)
48%	2%	3%	15%	17%	15%

Q138 How satisfied are you with any communication you have had with GAP staff? (*n* = 159, average = 4)

I have never had any communication with GAP staff (no value)	a. Completely dissatisfied (1)	b. Somewhat dissatisfied (2)	c. Neither dissatisfied nor satisfied (3)	d. Somewhat satisfied (4)	e. Completely satisfied (5)
42%	3%	5%	12%	16%	23%

Q139 How did you learn to make use of GAP data? (*n* = 281)

Respondents were asked different follow-up questions on the basis of their answer to Q139. The follow-up questions are included in the frequency table of responses to Q139.

Response		Percent
a. I figured it out myself.		**45**
Q140 How easy was it to figure out how to use GAP in your work? (*n* = 121, average = 4)		
a. Very difficult (1)		
b. Somewhat difficult (2)	13%	
c. Not difficult or easy (3)	30%	
d. Somewhat easy (4)	**32%**	
e. Very easy (5)	25%	
b. A colleague helped me learn what I needed to know in order to use the data.		32
Q141 How easy was it to find a colleague who could provide you with the needed assistance? (*n* = 89, average = 4)		
a. Very difficult (1)	2%	
b. Somewhat difficult (2)	11%	
c. Not difficult or easy (3)	17%	
d. Somewhat easy (4)	**37%**	
e. Very easy (5)	33%	
c. A member of GAP staff helped me learn what I needed to know to use the data.		14
Q142 How accessible were GAP staff when you needed assistance? (*n* = 39, average = 4)		
a. Extremely inaccessible (1)		

b. Somewhat inaccessible (2)	10%	
c. Neither inaccessible or accessible (3)	15%	
d. Somewhat accessible (4)	**39%**	
e. Extremely accessible (5)	36%	
Q143 How satisfied were you with the assistance you received? (*n* = 39, average = 4)		
a. Completely dissatisfied (1)	3%	
b. Somewhat dissatisfied (2)	8%	
c. Neither satisfied or dissatisfied (3)	13%	
d. Somewhat satisfied (4)	33%	
e. Completely satisfied (5)	**44%**	
d. I used resources on the GAP web site.		10

Distribution of GAP Data and Products Based on GAP Data

Q144 How would you characterize GAP's coordination with other agencies to promote awareness and use of GAP datasets? (*n* = 268)

Response	Percent
a. Insufficient to the point of rendering unusable the data that GAP provides because of lack of awareness.	4
b. Insufficient to the point that the data GAP provides are less widely used than they could be because GAP doesn't coordinate much with other agencies.	14
c. Sufficient to the point that the most likely users of GAP data are aware of how to obtain data as the result of GAP coordination other agencies.	28
d. Sufficient to the point that both likely and unlikely users are aware of GAP data due to GAP coordination with other agencies.	8
e. I cannot judge this.	**46**

Q145 Do you personally know someone who was involved in developing a regional GAP project? (*n* = 264)

Response	Percent
a. Yes	**62**
b. No	38

Q146 Do you personally know someone who is currently employed by GAP? (*n* = 250)

Response	Percent
a. Yes	31
b. No	**69**

Q147 Do you personally know someone who was involved in developing a state GAP project? (*n* = 258)

Response	Percent
a. Yes	**75**
b. No	25

Q148 How frequently do you send GAP datasets (in original form, without additions or revisions) to someone else? (*n* = 276)

Response	Percent
a. Never	**72**
b. Up to several times a year	26

c. Once a month	2
d. Once a week	
e. Daily	<0.5

Respondents who indicated that they never send GAP datasets to others were directed to Q150. Respondents who indicated that they send GAP datasets with any degree of frequency were asked a follow-up question (Q149).

Q149 To whom have you distributed GAP data in its original form, without additions or revisions? Select all that apply. (*n* = 74)

Response	Number of times selected	Percent
a. A colleague at my workplace	**50**	**68**
b. A colleague in my local area	30	41
c. A colleague in my state	45	61
d. A colleague in my multi-state region	29	39
e. A colleague in another part of the country	18	24
f. A colleague in another country	5	7
g. None of these descriptions apply	5	7

Q150 How frequently do you direct someone else to the GAP web site to download data? (*n* = 275)

Response	Percent
a. Never	**53**
b. Up to several times a year	46
c. Once a month	2
d. Once a week	<0.5
e. Daily	

Respondents who indicated that they never direct someone else to the GAP web site to download data were directed to Q152. Respondents who indicated that they direct someone else to the GAP web site to download data with any degree of frequency were asked a follow-up question (Q151).

Q151 Whom have you directed to the GAP web site to download data? Select all that apply. (*n* = 129)

Response	Number of times selected	Percent
a. A colleague at my workplace	**78**	**60**
b. A colleague in my local area	38	29
c. A colleague in my state	63	49
d. A colleague in my multi-state region	40	31
e. A colleague in another part of the country	40	31
f. A colleague in another country	6	5
g. None of these descriptions apply	9	7

Q152 How frequently do you send others to the GAP web site to use the online data viewers? (*n* = 275)

Response	Percent
a. Never	**72**

b. Up to several times a year	27
c. Once a month	1
d. Once a week	<0.5
e. Daily	

Respondents who indicated that they never send others to the GAP web site to use the online data viewers were directed to Q154. Respondents who indicated that they send others to the GAP web site to use the online data viewers with any degree of frequency were asked a follow-up question (Q153).

Q153 To whom have you recommended using the online data viewers on the GAP web site? Select all that apply. (*n* = 76)

Response	Number of times selected	Percent
a. A colleague at my workplace	**38**	**50**
b. A colleague in my local area	22	29
c. A colleague in my state	37	49
d. A colleague in my multi-state region	26	34
e. A colleague in another part of the country	22	29
f. A colleague in another country	4	5
g. None of these descriptions apply	11	14

Q154 How frequently do you send someone else an information product (map, chart, document) that you created based on GAP data? (*n* = 275)

Response	Percent
a. Never	36
b. Up to several times a year	**55**
c. Once a month	7
d. Once a week	3
e. Daily	<0.5

Respondents who indicated that they never send someone else an information product that they created based on GAP data were directed to Q158. Respondents who indicated that they do send someone else an information product that they created based on GAP data with any degree of frequency were asked a series of follow-up questions (Q155 through Q157).

Q155 To whom have you distributed the product (dataset, map, chart, or other document) that you made using GAP data? Select all that apply. (*n* = 173)

Response	Number of times selected	Percent
a. An individual who makes policy about conservation of biodiversity	66	38
b. An individual who implements policy about conservation of biodiversity	83	48
c. An individual who advocates policy about conservation of biodiversity	74	43
d. An individual who studies conservation of biodiversity	**98**	**57**
e. An individual who creates products to be used by those who implement, advocate, or make policy about biodiversity	77	45
f. None of these descriptions apply	32	18

Q156 When you distributed the product (dataset, map, chart, or other document) that you made using GAP data, to how many individuals did you distribute? (*n* = 172)

Response	Percent
a. An individual	**29**
b. A small group (3–5)	27
c. A moderate group (6–10)	17
d. A large group (11–50)	13
e. A very large group (such as a listserv)	1
f. An undefined group (made available to the public)	13

Q157 When you distributed the product (dataset, map, chart, or other document) that you made using GAP data, how broad was your intended audience? (*n* = 172)

Response	Percent
a. Local	31
b. State	**45**
c. National	16
d. International	8

Q158 Who is the primary recipient of the product you make using GAP data? (*n* = 266)

Response	Percent
a. Myself, I am the end user	14
b. Public, I publish	20
c. Legislators	<0.5
d. State planners	9
e. Land managers	**23**
f. I don't make any type of product using GAP data	16
g. Other: [open-ended response]	17
Theme: Multiple types of recipients (n = 8)	
Variety of above as well as students and other academics	
Local, State, Federal Agencies, private clients	
All of the above	
Landowners, working groups, and the public	
State professionals and lay people	
Public, state employees	
Engineering project stakeholders, and for permitting purposes, some agencies	
Local planners, land managers, biologists, myself	
Theme: Colleagues (n = 6)	
Colleagues (2)	
Collegues in my organization	
Colleagues in other NGOs, landowners, agencies	
Work colleagues	
Colleague	
Theme: Nongovernmental organization (n = 3)	
Scientists at The Nature Conservancy	
Non-profit land trusts	

NGOs	
Theme: Local recipient (n = 3)	
Local planners	
Local land use planners, local decision makers	
Local Coastal Program Partners. (Other State Agencies, LGUs, Stakeholders, NOAA)	
Theme: Internal recipient (n = 3)	
My employer	
Internal staff	
Regulatory staff and management in my office	
Theme: Researchers (n = 2)	
Scientific researchers	
Research colleagues at my university	
Theme: Students (n = 2)	
Students	
College students	
Theme: Clients (n = 2)	
Clients/developers	
Clients	
No theme:	
Regional Bird Conservation Planners/Managers to include cross-boundary (Canadian) use	
Project reviewers	
Program Coordinators (Conservation)	
Information Managers	
I have sent data to the GAP office.	
Heads of Natural Resource Agencies	
Governing board	
Fisheries biologists.	
Fish and wildlife managers	
Developers considering development of property	
Decision-makers/line-officers	
Analytical results shared with professional archaeological organization	
Arkansas Wildlife Action Plan Fish Taxa Team	
Not Sure	
I don't use GAP data myself, worked in a group to utilize gap data to develop a conservation plan	
I don't make products, I use the information to improve my knowledge	

Q159 Which of the following best describes the aspect of decisionmaking present in your current position? (*n* = 269)

Response	Percent
a. I make decisions regarding how to define policies affecting conservation of biodiversity.	6
b. I implement but do not make policies affecting conservation of biodiversity.	8
c. I provide information products to those who make policies affecting conservation of biodiversity.	**52**
d. I decide what data to use in creating information products to be used by those who make or implement policies affecting conservation of biodiversity.	14
e. None of the above	20

Q160 Have you ever used a GAP dataset or a product based on GAP data to make a decision that had a direct effect on conservation of biodiversity? (*n* = 273)

Response	Percent
a. Yes	43
b. No	**58**

Respondents who answered "Yes" to Q160 were next asked Q161 through Q163. Respondents who answered "No" to Q160 were next asked Q164 in the next section of the survey. When asked the following questions, respondents were instructed to think about the most recent time when they used a GAP dataset or a product based on GAP data to make a decision that had a direct effect on conservation of biodiversity.

Q161 Without the information that GAP data provided, the decision made would have been very different. (*n* = 113, average = 3)

a. Strongly disagree (1)	b. Somewhat disagree (2)	c. Neither agree nor disagree (3)	**d. Somewhat agree (4)**	e. Strongly agree (5)
4%	9%	36%	**38%**	12%

Q162 How successful would you say GAP data or products were in influencing the decision? (*n* = 113, average = 4)

a. Very unsuccessful (1)	b. Somewhat unsuccessful (2)	c. Neither successful nor unsuccessful (3)	**d. Somewhat successful (4)**	e. Very successful (5)
1%	5%	13%	**66%**	15%

Q163 No decision would have been made without the information provided by GAP data. (*n* = 113, average = 2)

a. Strongly disagree (1)	b. Somewhat disagree (2)	c. Neither agree nor disagree (3)	d. Somewhat agree (4)	e. Strongly agree (5)
36%	26%	27%	6%	5%

Opinions of Possible Future Actions

This section of the survey includes questions regarding actions that GAP could take in the future to maximize the usefulness of its data.

Q164 Which database is most important to keep current? (*n* = 264)

Response	Percent
a. Land cover	**62**
b. Predicted species distributions	22
c. Stewardship/protected areas	16

Q165 Which is more important, to update existing data or to create new data? (*n* = 262)

Response	Percent
a. Update existing	**82**
b. Create new	18

Q166 What is the most important characteristic for future GAP data? (*n* = 262)

Response	Percent
a. That it be comparable to the current (regional) and past (state) GAP data	28
b. That it be at a higher resolution	**33**
c. That it be at a lower resolution	
d. That it be developed more closely with the individuals who will be primary users of the data	17
e. That it be seamless and nation-wide	22

Q167 I intend to use new releases of GAP data in the future. (*n* = 265, average = 4)

a. Strongly disagree (1)	b. Somewhat disagree (2)	c. Neither agree nor disagree (3)	d. Somewhat agree (4)	**e. Strongly agree (5)**
5%	3%	20%	31%	**41%**

Q168 I would use national level GAP data. (*n* = 264, average = 3)

a. Strongly disagree (1)	b. Somewhat disagree (2)	c. Neither agree nor disagree (3)	**d. Somewhat agree (4)**	e. Strongly agree (5)
8%	15%	24%	**33%**	21%

Q169 What process change would have the greatest effect on improving use of GAP data? (*n* = 256)

Response	Percent
a. Correcting errors/omissions in existing datasets	**35**
b. Creating datasets more quickly from newer data	33
c. Incorporation of aquatic GAP datasets	13
d. Provision of a GAP Helpdesk, where users could submit technical questions and issues for response by a GAP staff member	1
e. Training offered on use of GAP data	7
f. Aggressive marketing of GAP data to potential users	5
g. Other: [open-ended response]	6
Theme: Don't know (n = 6)	
Unknown (2)	
No opinion	
No idea	
I don't know how others are using it so I don't know	
Don't know	
Theme: Update (n = 2)	
Updating/creating new higher spatial resolution state/regional seamless data sets. Current regional dataset based on LANDFIRE data have many omission commision errors	
Updating land cover	
No theme:	
Understanding the problem users have with the current data limitations to make a better product	
Standardize processes	
Refining vegetation breaks	
Making data available in non-proprietary formats	
Making all states' GAP data equally available	

Make the aquatic gap products available and finish for the nation. There are aquatic gap projects that have been completed up to two years ago but those datasets have not been made available.	
Accuracy assessment	
Better base data layers, better process for analyses	

Q170 How useful would it be to have access to an individual to answer questions about using GAP data? (*n* = 257, average = 2)

a. Not at all useful (1)	**b. Somewhat useful (2)**	c. Moderately useful (3)	d. Very useful (4)
11%	**58%**	19%	12%

Q171 How useful would it be to have access to an individual who could help you modify GAP data for specific use? (*n* = 258, average = 2)

a. Not at all useful (1)	**b. Somewhat useful (2)**	c. Moderately useful (3)	d. Very useful (4)
16%	**52%**	16%	16%

Outreach Methods

GAP is interested in learning about effective means by which to communicate with current and potential users of GAP data. This section of the survey included questions asking respondents' opinions about possible outreach methods.

Q172 What factors would affect your attendance at a GAP conference? (select all that apply) (*n* = 264)

Response	Number of times selected	Percent
a. Cost	**206**	**78**
b. Location	182	69
c. Supervisory permission	88	33
d. Topics covered at the conference	155	59
e. Educational/Training Credit	10	4
f. Other: [open-ended response]	15	6
Theme: Relevance (n = 3)		
Relevancy to my work		
Not relevant to current position.		
Ability of new GAP data to meet the needs of my job		
Theme: Timing (n = 2)		
Timing of conference		
Time of year - would prefer summer		
Theme: Multiple factors (n = 2)		
All or the above with exception of last		
All of the above		
No theme:		
Would not attend		
Relationship to Gap Data Use		
Only if I were a presenter		

Need to know		
I will go!		
Disabled		
A webinar I find very effective especially if it is recorded		

Q173 How likely is it that you would attend an annual GAP conference? (*n* = 270, average = 3)

a. Very unlikely (1)	b. Somewhat unlikely (2)	c. Neither likely nor unlikely (3)	d. Somewhat likely (4)	e. Very likely (5)
26%	24%	21%	25%	4%

If respondents indicated they would be "Very unlikely" to attend an annual GAP conference, they skipped Q174 through Q176 and were asked Q177. Respondents who selected any other option for Q173 were asked Q174 through Q176.

Q174 What topic would you most like to see covered at a GAP conference? Select one. (*n* = 195)

Response	Percent
a. Demonstrations by GAP staff of the uses of various GAP datasets	20
b. Submissions and presentations by others demonstrating how they have used GAP data	**35**
c. Ongoing discussions about the advantages and limitations of using GAP data	16
d. In-depth workshops on how to use GAP data	11
e. Presentations on current and in-development GIS software	2
f. Presentations/discussions on conservation of biodiversity	10
g. Other: [open-ended response]	6
Theme: Aquatic data (n = 2)	
Aquatic GAP projects	
Using Arkansas aquatic gap data - specific.	
No theme:	
Working sessions with GAP staff to create better products	
Results from research	
Present/discussions on updating datasets, maintaining time-relevant info	
Informaton on how products are improving	
Funding for GAP state programs	
Error modeling and confidence mapping	
Discussion or training in conservation planning/landscape ecology methodology that I am not already familiar with (e.g. new/cutting edge methods, not the same stuff I've been doing for years), as it pertains to GAP data of course. Incorporation of climate change concerns in particular.	
Data and metadata management	
Bullets 2, 3, and 5	

Q175 How likely is it that you would submit a presentation to a GAP conference? (*n* = 197, average = 2)

a. Very unlikely (1)	b. Somewhat unlikely (2)	c. Neither likely nor unlikely (3)	d. Somewhat likely (4)	e. Very likely (5)
31%	23%	21%	19%	6%

Q176 How useful would it be to have access to the proceedings from a GAP conference? (*n* = 194, average = 3)

a. Not at all useful (1)	**b. Somewhat useful (2)**	c. Moderately useful (3)	d. Very useful (4)
4%	**41%**	31%	25%

Q177 What outreach activity would be most useful in reaching potential users of GAP data? [open-ended response] (*n* = 106)

If a respondent made multiple comments, the comments were split into independent components before the responses were summarized.

Response
Theme: Webinars (n = 14)
Webinars (5)
Webinar announced through LCCs, Western Governor's Association, other regional organizations.
Webinar and Web-based training
Recorded webinars showing applied uses of gap data, perhaps content suggested by users
Probably trainings, webinars.
Perhaps web-based seminars
Online tutorials or webinars
Free Online Seminars
Online webinars
Email and short 1/2 hour webinars.
Theme: GAP presence at other conferences (n = 12)
Presence at state wide GIS conferences
Perhaps rather than reinvigorating the GAP meetings, aim for a consistent presence at other major conferences; like ESA, and with close partner meetings, like NatureServe's annual meeting. A Gap booth with contributed papers/workshops might be more effective given limited travel budgets.
Outreach in coordination with existing conferences and meetings.
I think that you probably reach the widest audience by having presentations/posters at conferences. That is where I learned about the national seamless distribution models.
Having a GAP session or training at ecological conferences.
Hard to say, presence at the major conferences (e.g., ESRI UC, SCB, Ecology)
GAP presentations at state, regional, national level fisheries/wildlife meetings
Conference level
Attendance at state conferences such as the conferences for state chapters of The Wildlife Society.
Attendance at national and international ecological conferences
Presentations at other professional conferences.
Session at a state GIS Conference.
Theme: GAP hosts meetings in local areas (n = 12)
Speakers coming to our state
Regional workshops.
Regional meetings
Regional conference
Meeting with State planners.
Meet with indiv state agencies
Local meetings with current and potential GAP data users.
Have USGS GAP instructors come to our institution to teach GAP and collaborate on GAP-related projects with my state agency.

Have local half-day presentations in each state for GIS users. Get them out of the office with their full attention on GAP data, show them uses and limitations, and take their feedback on what their needs are.
Have a multi-state (regional) GAP Conference.
Area training sessions on its use
A one day course on the use of GAP data that is cheap and in my state/city. With topics useful enough so that my supervisor can justify sending people.
Theme: Email (n = 8)
E-mail (3)
Email/website information
Email users who've registered themselves as users of GAP data.
Email newsletters
Sending an email with a link to the web site, and links to different web pages on the site
Email marketing through conservation societies
Theme: Publication (n = 6)
Scientific publication
Publish results in peer reviewed journals.
Publications that show how GAP data are being used
Publications that illustrate how GAP data has been used for conservation.
Editing an indexed journal which would publish results from research related to gap analysis.
Reference in National Press, Use as primary data source in Professional Journals (Science, Nature, Annals of A Geographers, Biodiversity, etc).
Theme: Web site (n = 5)
Web site
Up to date web-site
Website with use cases with frequent posts
Posting Gap products and links to published papers and unpublished reports using Gap on the Gap website (and keeping the site current)
Better, more functional website; fewer sites to go to for federal GIS data; better SDMs, with better documentation about how they were made
Theme: Collaboration/Coordination with individuals and other groups (n = 5)
Developing capacity to assist users with implementing GAP information through collaboration.
Coordination and collaboration with state and federal agencies
Coordinate with State Landcover mapping programs.
Convey use of data to and through regional conservation partnerships like Joint Ventures, regional state agency organizations, etc.
Contacting local GIS users groups and making announcements through them
Theme: Examples (n = 5)
Specific examples of success
Examples of usage
Demonstration of various uses of GAP products and their accuracies or reliabilities, independently measured
Showcasing applied research using GAP products.
Examples of applications of GAP data.
Theme: Don't know (n = 5)
I don't know (2)
Unsure
I have no idea

?
Theme: Communicate information about updates (n = 4)
Regular status updates
Information on new data and resolution
Immediate notification of updated datasets and notification of improvements to resolution.
Active digital communication about updates and applications
Theme: Training (n = 4)
Training (2)
GIS training
Working with and training people in regional/state agencies.
Theme: Send periodic email news (n = 3)
Quarterly newsletter by email
Occasional emails announcing new or updated products.
Email newsletter or bulletin twice per year
Theme: Newsletter (n = 3)
Yearly newsletter describing GAP.
An easily accessible newsletter that provided how to articles and information on improvements and updates. This might already exist and I am not aware of it.
A GAP blog or newsletter?
Theme: Make others aware (n = 3)
People do not know what are available. Outreach activities focused on this will help
More promotion about its products and uses to make informed decisions.
Advertise in social media or through one of ESRI's publications.
Theme: University (n = 2)
Use in university labs.
Presenting the tool to Graduate Students/Professors at the Universities
Theme: Internet (n = 2)
Internet (2)
No theme:
Submit questionnaires for user input with product downloads.
Specific interpretations of landcover data.
Annual update of cheatgrass cover map of the Great Basin. Annual update of big sagebrush cover to account for fires, development, ...
Standardization on GAP layers, at correct scale, for more detailed landcover (vice NLCD/Landfire) and species distribution data by other Federal Agencies, Regions and States.
What can it do that other data sets cannot do?
Provide small grants to conservation organizations to highlight innovative uses of GAP data
Periodic meetings.
Metadata and link and maintain such servers and linked with USGS/NBII and GBIF + GCMD etc
Making predicted species distribution maps readily available at a variety of geographic extents.
Level of confidence in products
LandFire actively solicits updates of their data products. GAP should do the same.
Join the fire program?
Impact of utilities on the environment
Ability to tailor GAP products for specific applications rather than attempt to demonstrate value of existing data to all applications.

	Better data
	Information available at the state GIS portal
	How do I get it?
	Decision makers (Commissioners) do not know GAP exists.

Q178 Have you ever used information that you located in the GAP Bulletin publication? (*n* = 270).

Response	Percent
a. Yes	20
b. No	**80**

If respondents answered "No" to this question, they were asked a follow-up question (Q179) and then directed to Q182. If respondents answered "Yes" to this question, they were asked Q180 and Q181 as follow-up questions.

Q179 Why haven't you used information from the GAP Bulletin publication? (*n* = 211)

Response	Percent
a. I'm not familiar with the GAP Bulletin.	**79**
b. The information provided is too narrow in focus to be of use to me.	2
c. Never had an occasion to use information from the Bulletin.	18
d. Other: [open-ended response]	1
Theme: Not relevant (n = 2)	
It is not relevant to my current work	
It no longer relates to my job	
No theme:	
Is the Bulletin still published?	

Q180 How useful was the information that you located in the GAP Bulletin? (*n* = 51, average = 3)

a. Not at all useful (1)	**b. Somewhat useful (2)**	c. Moderately useful (3)	d. Very useful (4)
2%	**43%**	41%	14%

Q181 How would you rate the quality of the GAP Bulletin as an information source? (*n* = 49, average = 3)

a. Poor (1)	b. Fair (2)	**c. Good (3)**	d. Excellent (4)
	41%	**53%**	6%

Q182 When was the last time you visited the GAP web site? (*n* = 270)

Response	Percent
a. Never	14
b. Within the last 4 months	22
c. Within the last 5–8 months	15
d. Within the last 9–12 months	10
e. More than 1 year ago	**39**

Respondents who answered that they have never visited the GAP web site skipped Q183 and Q184 and went directly to the next section of questions beginning with Q185. Respondents who indicated they had ever visited the GAP web site were asked Q183 and Q184.

Q183 What was your purpose in visiting the site? (*n* = 225)

Response	Percent
a. Obtain information	**51**
b. Download data	30
c. Use a web map service	6
d. Use the Gap Ecosystem Data Explorer tool	1
e. Find contact information	5
f. Other: [open-ended response]	8
Theme: Check for updates (n = 4)	
See what was new	
See changes	
Check for updates	
Checking for new or updated information	
Theme: Check availability of data (n = 3)	
To see what datasets were available	
To see if the data I helped create were being served yet	
See if Maryland was covered in a regional GAP project	
Theme: Don't remember (n = 2)	
I forget	
Don't remember, it was so long ago.	
No theme:	
Review GAP data prior to survey	
Review draft models at request of GAP	
Point a user to the site	
Find out what it is	
Check the accuracy of a specific distribution model	
1,2,4	
Looking for applications of the data	
To obtain proper reference for California GAP program	

Q184 Did your visit to the web site meet your needs? (*n* = 219)

Response	Percent
a. No	6
b. Yes, the visit met a few of my needs	33
c. Yes, the visit met most of my needs	**37**
d. Yes, the visit met all of my needs	24

Reputation of GAP

In this section of the survey, respondents were asked their opinions regarding the reputation of GAP and the data it produces.

Q185 GAP is mostly unknown in the community of conservation professionals. (*n* = 256, average = 4)

a. Strongly disagree	**b. Somewhat disagree**	c. Neither agree nor disagree	d. Somewhat agree	e. Strongly agree
(5)	**(4)**	(3)	(2)	(1)
26%	**36%**	21%	14%	3%

Q186 GAP is mostly unknown in the GIS user community. (*n* = 256, average = 3)

a. Strongly disagree	**b. Somewhat disagree**	c. Neither agree nor disagree	d. Somewhat agree	e. Strongly agree
(5)	**(4)**	(3)	(2)	(1)
20%	**36%**	20%	20%	5%

Q187 The Gap Program has a reputation as being a credible source of data. (*n* = 255, average = 4)

a. Strongly disagree	b. Somewhat disagree	c. Neither agree nor disagree	**d. Somewhat agree**	e. Strongly agree
(1)	(2)	(3)	**(4)**	(5)
1%	8%	29%	**49%**	13%

Q188 GAP has a unique niche in the biodiversity data it provides. (*n* = 255, average = 4)

a. Strongly disagree	b. Somewhat disagree	c. Neither agree nor disagree	**d. Somewhat agree**	e. Strongly agree
(1)	(2)	(3)	**(4)**	(5)
<0.5%	8%	24%	**47%**	22%

Q189 GAP is losing ground to competing organizations that produce similar data. (*n* = 254, average = 3)

a. Strongly disagree	b. Somewhat disagree	**c. Neither agree nor disagree**	d. Somewhat agree	e. Strongly agree
(5)	(4)	**(3)**	(2)	(1)
4%	10%	**53%**	26%	8%

Q190 Do the GAP program and its data have a national reputation? (*n* = 256)

Response	Percent
a. GAP is not known	1
b. Known to a few individuals nation-wide	3
c. Known to some individuals nation-wide	21
d. Known to many individuals nation-wide	29
e. Well known nation-wide	15
f. Cannot judge	**31**

Q191 Do the GAP program and its data have a state-level reputation? (*n* = 258)

Response	Percent
a. GAP is not known	<0.5
b. Known to a few individuals state-wide	11
c. Known to some individuals state-wide	25
d. Known to many individuals state-wide	**29**
e. Well known state-wide	18
f. Cannot judge	17

Q192 Do the GAP program and its data have a municipal/county level reputation? (*n* = 258)

Response	Percent
a. GAP is not known	15
b. Known to a few individuals at the level of cities and counties	19
c. Known to some individuals at the level of cities and counties	16
d. Known to many individuals at the level of cities and counties	5
e. Well known at the level of cities and counties	2
f. Cannot judge	**43**

Q193 In your opinion, approximately what percent of people who could potentially use GAP data actually know about GAP and the data it provides? (*n* = 246)

Response	Percent
a. Less than 10%	11
b. Between 10 and 25%	27
c. Between 26 and 50%	**32**
d. Between 51 and 75%	22
e. Between 76 and 100%	8

Q194 How strongly would you recommend use of GAP data to others, assuming they had an appropriate need for the type of data that GAP provides? (*n* = 253)

Response	Percent
a. I would give my strongest recommendation to someone considering use of GAP data.	12
b. I would recommend use of GAP data.	**77**
c. I would hesitate to recommend use of GAP data.	9
d. I would caution against use of GAP data.	3
e. I would strongly urge others not to use GAP data.	<0.5

Q195 Have you recommended use of GAP data to someone else? (*n* = 265)

Response		Percent
a. Yes		**79**
Q196 After you made the recommendation, did you receive feedback from the person to whom you recommended use of GAP data? (*n* = 203)		
a. No, no feedback	**75%**	
b. Yes, positive feedback	22%	
c. Yes, negative feedback	3%	
b. No		22
Q197 What is the main reason why you have not recommended GAP data to someone else? (*n* = 56)		
a. No appropriate opportunity has presented itself.	**57%**	
b. I have reservations about the accuracy of the data.	9%	
c. I have reservations that the data are outdated.	7%	
d. I had difficulty in using GAP data myself.	4%	
e. GAP data are missing relevant content.	7%	
f. Other: [open-ended response]	16%	
Theme: Lack of familiarity (n = 3)		
Unfamiliarity with gap data other than the protected lands layer		

I don't use it. Not familiar enough		
Don't know enough about it		
Theme: Resolution (n = 2)		
Scale of resolution too coarse, neither accuracy nor methodology not fully given in the past		
Doesn't meet resolution needs.		
Theme: Don't use GAP (n = 2)		
I don't use GAP		
I do not use GAP data and do not have an opinion		
No theme:		
No reason to recommend		
I mostly use other data		

Goals and Objective of GAP

In this section, respondents were asked to assess how well GAP is meeting its goals and objectives. This is the last section of survey questions.

Q198 In your experience and opinion, in what way are GAP datasets most frequently used? (*n* = 251)

Response	Percent
a. To solve policy issues such as land use issues relating to conservation	14
b. To provide decisionmakers with knowledge about topics such as conservation concepts, models or priorities	**38**
c. To legitimize decisions, such as decisions about land use and land protection, made on the basis of other information	21
d. To conduct academic research to fulfill course or degree requirements or for the purpose of publication	14
e. To conduct applied research that is conducted for some reason other than to inform conservation decisionmaking	14

Q199 In your experience and opinion, what is the most appropriate use for GAP datasets? (*n* = 251)

Response	Percent
a. To solve policy issues such as land use issues relating to conservation	15
b. To provide decisionmakers with knowledge about topics such as conservation concepts, models or priorities.	**53**
c. To legitimize decisions, such as decisions about land use and land protection, made on the basis of other information.	20
d. To conduct academic research to fulfill course or degree requirements or for the purpose of publication.	4
e. To conduct applied research that is conducted for some reason other than to inform conservation decisionmaking.	8

Q200 Please rate how helpful GAP data are or could be in addressing the following issues:

	Cannot judge (no value, excluded from average)	Not at all helpful (1)	Slightly helpful (2)	Moderately helpful (3)	Helpful (4)	Very helpful (5)
Habitation conversion/loss (*n* = 245, average = 4)	11%	2%	8%	15%	**40%**	24%
Habitat conservation (*n* = 242, average = 4)	9%	1%	8%	13%	**42%**	27%
Invasive/exotic species	20%	12%	**23%**	13%	**23%**	9%

(*n* = 239, average = 3)						
Changes in hydrological processes/Hydrologic restoration (*n* = 243, average = 3)	**33%**	12%	24%	18%	10%	4%
Pollution (*n* = 242, average = 2)	**38%**	21%	20%	15%	5%	2%
Fire suppression (*n* = 243, average = 3)	**28%**	7%	23%	18%	21%	3%
Disturbance caused by transportation/ infrastructure development (*n* = 241, average = 3)	18%	3%	20%	22%	**29%**	8%
Consumptive use of biological resources (*n* = 241, average = 3)	**25%**	10%	22%	17%	23%	3%
Improper forest management (*n* = 237, average = 3)	**29%**	10%	20%	18%	19%	4%
Lack of knowledge about species (*n* = 239, average = 3)	18%	4%	18%	19%	**30%**	12%
Climate change (*n* = 238, average = 3)	23%	8%	15%	18%	**28%**	8%
Loss of natural community integrity (*n* = 241, average = 3)	18%	5%	15%	22%	**29%**	12%
Degradation of migration corridors/routes (*n* = 238, average = 3)	17%	3%	13%	21%	**31%**	14%
Destructive resource harvesting (*n* = 236, average = 3)	**25%**	7%	21%	21%	23%	4%
Non-consumptive use of resources (*n* = 238, average = 3)	**32%**	14%	22%	18%	12%	2%
Research on species (*n* = 238, average = 3)	16%	4%	15%	22%	**28%**	16%
Private land conservation (*n* = 236, average = 4)	13%	4%	10%	25%	**36%**	13%
Restoration of Species of greatest conservation need (SGCN) and habitats (*n* = 237, average = 4)	17%	5%	9%	21%	**35%**	14%
Species conservation and/or management (*n* = 241, average = 4)	10%	1%	8%	21%	**40%**	19%
Research on habitats (*n* = 239, average = 4)	11%	2%	10%	17%	**40%**	20%
Public lands conservation (*n* = 238, average = 4)	8%	2%	8%	16%	**42%**	24%

Q200a Other current biological conservation issue(s) that GAP data could be helpful in addressing? [open-ended response] (*n* = 20)

Response
Theme: Don't know (n = 3)
Not sure of any to add.
I do not know for now.
I am not a user to be able to judge the product; would like to learn about it and become a user however.
Theme: Aquatic issues (n = 2)
Fish habitat issues if aquatic gap data was more available.
Aquatic gaps still needs more work. My comments mainly address aquatic gap.
No theme:
Wetland inventory
The above question is not well worded because it says ARE or COULD BE. All of the above COULD be helpful, if the products were developed and disseminated in a consistent, reliable manner
Prioritizing integrated conservation and restoration
Landscape scale conservation planning is the most relevant appliation of gap data historically. Inclusion of additional data sets - could extend the application to other issues.
Landscape Change
Integrating biodiversity and wildlife habitat values with the provision and quality of closely related ecosystem services - and bringing that combined information into assessment and planning decisions; mostly at ecoregion scales.
Increases in impervious surfaces
Forest health and insect outbreaks
Forecasting and Backcasting + Research and Monitoring Designs
Fire issues, water issues (drought)
Endangered species/ecosystem management
Ecological patch analysis
Conversion of grasslands regionally
Urban-wildland dynamics
None

If respondents selected option "Not at all helpful" for any of the topics listed in Q200, they were directed to Q201; otherwise, respondents were directed to Q202.

Q201 You indicated that GAP data are not helpful for one or more of the named issues. Why are GAP data not helpful in addressing those issues? (*n* = 93)

Response	Percent
a. Data quality	16
b. Data availability, needed data are not available	16
c. Data are available but not in needed format or spatial resolution	18
d. Data are not helpful, because of limited awareness about GAP data	3
e. GAP data are just not relevant to these issues	**31**
f. Other: [open-ended response]	15
Theme: Outdated data (n = 3)	
The data is too old	
GAP maps are not updated through time	
Data are outdated	

Theme: Issues with land-cover data (n = 3)	
Landcover classes too vague.	
Lack of condition/quality of veg	
Data do not represent temporal trends in land cover.	
No theme:	
Scale. NAIP + vegetation inventory/monitoring is more useful for most of my needs.	
No accuracy assessment	
I am not aware of migration data being available, although the land cover data can probably be used to address this	
Data are not updated enough to monitor change or change is due to better data but not new conservation	
Combination of quality and availability	
Alternative data sources better and more available	

Q202 The information products that can be derived from GAP data are compatible with existing policy making processes and models. (*n* = 241, average = 4)

a. Strongly disagree (1)	b. Somewhat disagree (2)	c. Neither agree nor disagree (3)	**d. Somewhat agree (4)**	e. Strongly agree (5)
1%	3%	38%	**44%**	14%

Q203 GAP data are relevant to currently pending decisions that relate to the conservation of biodiversity. (*n* = 240, average = 4)

a. Strongly disagree (1)	b. Somewhat disagree (2)	c. Neither agree nor disagree (3)	**d. Somewhat agree (4)**	e. Strongly agree (5)
1%	3%	23%	**53%**	20%

Q204 I believe individuals who are in positions to make decisions about conservation of biodiversity would be open to considering the type of information products that could be produced using GAP data. (*n* = 240, average = 4)

a. Strongly disagree (1)	b. Somewhat disagree (2)	c. Neither agree nor disagree (3)	**d. Somewhat agree (4)**	e. Strongly agree (5)
<0.5%	3%	15%	**56%**	26%

Q205 To what extent has GAP met its objective to assess the geographic extent of biodiversity in the United States? (*n* = 242)

Response	Percent
a. GAP has done nothing to meet this objective.	
b. GAP is less than halfway to meeting this objective.	11
c. GAP is about halfway to meeting this objective.	12
d. GAP is more than halfway to meeting this objective.	27
e. GAP has completely met this objective.	5
f. I don't have enough knowledge to make this judgment.	**44**

Q206 To what extent has GAP met its objective to assess the amount of biodiversity found on protected lands? (*n* = 241)

Response	Percent
a. GAP has done nothing to meet this objective.	<0.5
b. GAP is less than halfway to meeting this objective.	11
c. GAP is about halfway to meeting this objective.	13
d. GAP is more than halfway to meeting this objective.	26
e. GAP has completely met this objective.	7
f. I don't have enough knowledge to make this judgment.	**42**

Q207 How would you grade the current performance of GAP on building institutional cooperation in the application of its information to state and regional management activities? (*n* = 242, average = 3)

a. A (4)	b. B (3)	c. C (2)	d. D (1)	e. F (0)	**f. I don't have enough knowledge to grade this item (no value)**
9%	22%	16%	8%	1%	**44%**

Q208 How would you grade the current performance of GAP on providing information to the public and to those organizations charged with natural resource research, policy, planning, and management? (*n* = 241, average = 2)

a. A (4)	b. B (3)	c. C (2)	d. D (1)	e. F (0)	**f. I don't have enough knowledge to grade this item (no value)**
9%	22%	23%	8%	2%	**37%**

General Comment

Q209 End question: Would you like to provide any other comments about the data provided by the Gap Analysis Program? [open-ended response] (*n* = 70)

Response
Theme: Update needed (n = 11)
When are we ever going to get Arkansas updated?
There is a need to update/create new higher spatial resolution land cover maps for the Northern Great Plains. There has been a lot of land cover change in recent years in response agricultural and energy policies. RapidEye imagery would be cost effective for this work. The current regional products from the LandFire program are of lower quality than the older state products.
The GAP land cover data in Minnesota is currently worthless because of its age - it's derived from LandSat images from the early 1990's. In fact, the data took so long to create it almost worthless as soon as it was released, and was immediately displaced by the NLCD.
It was revolutionary in scope and detail when it first came out. Unless data is updated fairly regularly, gap data is in danger of becoming irrelevant and un or under used.
It needs to be updated with whatever new habitat-relevant digital layers are available.
I use SWreGAP data from the Utah GIS portal and would use it more if it were up to date. Up until earlier this year, I relied on that data for remote landcover analysis. A university-based GIS professional told me that he hardly ever uses it now because it is out of date and less reliable than Landfire, so I've been switching to Landfire. I am not familiar with a general GAP website or the national GAP program. In Utah, my access to species predictions has been limited and the data pretty hard to find. My biggest complaints with the GAP data I have used are that it is not up date and too coarse-scale to adequately represent riparian areas and other thin/small features in this western landscape. My biggest complaint with Landfire data is that it is only available in raster format. It is easier for me to

work with polygons than with raster pixels.
I think the GAP data is great, just too old in our state, which is rapidly changing.
GAP data are very valuable to Minnesota's Coastal management program. It would be great to see a stronger relationship with NOAA C-CAP program and an update to land cover and land stewardship data.
GAP data are useful, but in MN they are 20 years out of date. They are still useful in the boreal part of the state; not so much elsewhere. Classification reliability at Level 4 is generally poor, which is why I almost always aggregate and reclass at Level 3.
Almost all my responses reflect one basic issue: the Midwest needs an updated regional GAP.
An update cycle would allow correcting spatial and attribute errors as well as improving currency. Stewardship changes faster than landcover and is easier to update.
Theme: No comments (n = 10)
None
No (9)
Theme: What would be helpful (n = 8)
The most common critique I hear about Gap is that the data are not accurate enough at high resolution. Personally, I understand the limitations of the input data and the appropriate scale for most datasets, but many end-users fail to appreciate this. The scale mismatch issues are greatest in the land cover layer - especially with aquatic features. Gap could do a better job of explaining this problem to end users.
We use GAP for two things: land use change and species distribution models. I really want to see GAP gain more detail in each. The species models are created on a regional scale and they are are very useful at that scale, but at the local scale, they are less useful. It would be fantastic if additional information could be brought forward to merge GAP models with more current information (about habitat) and observations.
We need maps that show stand age or seral stage. We need higher resolution species distribution maps based on models that use stand age or seral stage as predictor variables. Models for mapping species distributions should also use minimum area requirements of a species as predictors variables.
Most program efforts are on data development and provision, but not enough focuses on analysis. Much more valuable attention would come to the program if there was greater emphasis placed on analysis and drawing helpful conclusions; aim at national scale assessment (not planning, assessment) and bring in your cooperator community to prioritize and carry off the analyses under the Gap Program flag. The main results of national "gap analysis" (in its many forms) should be common knowledge in Washington DC; and to regional leadership of federal land managers, and within leaders of state agencies.
More species please
Another protected area dataset is the one put out by CBI (*http://www.protectedlands.net/*). I know they are similar, but there are some differences. It is very confusing about what dataset I should use and what exactly is the difference between them. I would like to see the USGS put out some information on the differences, and the appropriates uses of each.
My employer put money into developing the state GAP program many years ago and I have forgotten all about it because I did not have direct access to the program. Our GIS folks need to inform biological staff that it is available and help us get access to it.
GAP needs to serve people on a state by state basis. Workshops in each state would be good. Feds usually ignore Arkansas. The program needs to focus more on aquatic gap. It it too terrestrial oriented.
Theme: Comment about the survey (n = 8)
This survey would have been better if there had been fewer questions about the "best" or most use of data, since we use species data almost as much as Land Cover data.
This survey was way too long to provide meaningful information.
This survey was too long. Suggest streamlining.
This survey may be meaningless. It appears to be directed solely at terrestrial issues, and most of my use has been stream characteristics models and fish mussel and crayfish distribution models for Missouri streams.
My use of GAP was old, so most answers for current GAP issues were guesses.
I am not a user, hence, was unable to comment effectively on many questions. Perhaps some changes to the

	beginning of the survey can help identify that point. I am merely here to learn about GAP and hopefully become a user at somepoint.
	I am a biologist, not a GIS specialist, so many questions were not appropriate. For GIS specialist in the Kansas Biological Survey, contact [personal information deleted] This questionaire is too long.
	Gap has several products, and this survey does not adequately separate out those products in the questions. The species distribution maps tend to be less credible than the pad us maps, in my view. There was no way to make this statement in the survey.
Theme: Outreach/cooperation (n = 5)	
	There has always been a weak connection between those who compile GAP data and those who could use it for conservation decisions. The program has failed to invest in sufficient outreach and development of synthesized information products that serve a broad audience. The program had a much higher profile in the early 90s than it does now, as it was a very early GIS product.
	It is a wonderful, ambitious program that has probably taken on too much with too little resources. GAP needs to become more cooperative, less defensive and turfy, and reach out more to academics, practitioners, and NGOs.
	I would like to know more of how to use the GAP tools in Puerto Rico. Little is known about these tools. Present GAP to the university professionals and other personnel at the island.
	I think you need to get the program out there and sell it. You need to market to OFWIM, NSGIC and others. You should build collaborations with state and local agencies to build and use GAP data.
	I think there just needs to be more marketing, education and training on GAP. I think it is useful, but it previously had a reputuation of not being so good.
Theme: Aquatic data (n = 4)	
	I considered both the terrestrial and aquatic gap projects when responding to all of these questions but based on the definition of multiregion projects it was obvious that these questions where specifically directed at the terrestrial gap effort and ignored the aquatic component.
	I am really only familiar with the Great Lakes Aquatic GAP project, so many of the questions were not really relevant.
	Begin more fish and fisheries habitat data online.
	It is a great resource but more investment needs to be made and people need to use it more than it is being used. We need to do more for the aquatic and terrestrial GAP interfaces.
Theme: Comments about errors in or accuracy of data (n = 4)	
	Please provide a way for the land cover datasets to be updated, so we can correct errors. This is, I realize, easier said than done, but it can be done, particularly with the advent of GPS cameras. One photo says a lot.
	My experience has been that, in general, GAP land cover and species distribution maps contain too many errors for them to be relied upon, except as ancillary data when more accurate site-specific data are lacking.
	Part of the discussions our office has is in the accuracy of the data and the resolution of the data used in land management. Many have the perception that GAP data is too coarse for our needs.
	I haven't been very involved in Gap since the original Gap analyses back in the 90s (I was a developer of Gap data). My sense now is that Gap has addressed the issue of resolution, but still suffers from a real or perceived lack of accuracy, especially with land cover mapping. It's not that the methods used aren't appropriate, but that accurately mapping huge regions or even states is very very difficult at the level of accuracy needed by local-scale land managers. As you know, it's an old problem.
Theme: Timeliness (n = 4)	
	Probably my biggest problem, answering these questions relates to my extensive use and moderately high satisfaction with the 1997 products for Washington State and the more problematic experiences with the more recent effort which has produced some products that appear to be no better, in some ways worse than what was produced in 1997, a significant disappointment. The more recent products seem to have taken an inordinately long time to be completed and were not available when I had a critical need for them.
	In many places, this survey asked questions that were difficult to fully answer with the allowed choices. Ultimately, I believe the primary downfall of GAP is the inability to provide more timely and accurate data - primarily land cover. This isn't just a fault of GAP (NLCD, Landfire also have the same issue). Until steps are made to correct this, the same complaints and issues will continue to arise.

	I understand that it's a long and complicated process to create the vegetation maps, but if there's anyway to decrease the time lag between image acquisition and mapping that would be helpful. Also, a suite of products related to habitat quality and/or invasion by exotic species would be super helpful.
	I like the land use land cover GAP data set, however it should not take 10 years to develop new data sets. The imagery is completely out of date by the time the product is released.
Theme: Respondent's background or perspective (n = 4)	
	I was part of my state's GAP team and know how the data was collected and integrated into the data layers.
	I was envolved with Gap Analysis over 20 years. I currently teach in Portugal and GAP data is not available for this area
	I apologize for not answering all your questions. I hired consultants who used Gap data to create a regional GIS land cover map for me. I have never used the data myself, so felt unprepared to answer many questions. Having that data enabled us to promote and successfully implement local zoning policies leading to the conservation of 90,000 riparian acres in metropolitan Kansas city. I am supportive of strong national efforts to develop and use data for the variety of purposes outlined in this survey. I am not experienced enough with the data to evaluate how well it has served those purposes in the past.
	FYI. I do not use GAP data on a frequent basis. I've used GAP data for species/habitat conservation planning. And I am not that familiar with the uses of GAP data. Most of these questions were beyond my use experience.
Theme: Thanks (n = 3)	
	Thanks for all your good work on the GAP program!
	Thank you for your efforts.
	Thank you for all you do!
Theme: More useful data available (n = 2)	
	GAP is good for regional or cross-border analysis but anything limited to states or smaller generally has better data sources available
	GAP has largely become irrelevant to me in recent years as new alternative products have become available. I am in a portion of the country that has not gotten a sorely needed regional Re-GAP, so we've had to make do pursuing alternatives.
No theme:	
	I am using GAP data for my dissertation research project about how local land use / land cover changes impacts the local climate and meteorological events. Land Covers classes from GAP do not match simulation program LC classes because GAP data has higher resolution, is more specific and detailed about local species but is useful enough for analysis.
	The multiscale nature of biodiversity conservation requires interoperable multiscale products, GAP does not provide this. Many errors that managers find in GAP data are attributable to the scale at which the data are derived for (national - regional). People want to use GAP data for policy decisions that need higher resolution data so they become frustrated with GAP and it gets an undeservedly bad reputation.
	Sure, please call me for a follow up[personal information deleted] Overall, I would like to see GAP program more based on real science. The Landfire product was a plain disaster, as far as I can tell. How come?
	I find that people I work with often think the GAP program is no longer active. I do not hear GAP data mentioned in discussions at the LCC or JV/habitat partnership level. SWAP revisions are upon us, and many states have not incorporated GAP into their plans to the level that could be achieved (variety of reasons). So much opportunity but definitely a challange for GAP to re-establish itself especially in the East.
	I cannot recall hearing a single popular or scientific article citing GAP as a data source in the past 5+ years. Given the concerns over climate change, the GAP data set should be very relevant, yet it seems to have faded into the background. The reason for this eludes me.
	Again, as far as I know GAP never produced a credible land cover map of Texas. I am not familiar with the other Texas products.
	Management of wildlife is local not national. Many agencies that manage wildlife do not control the habitats on which wildlife occurs (eg private lands, or lands managed by other agencies). GIS-based analyses using GAP datasets may help provide acceptable maps, but the mindset or local governments and state agencies needs to change.

At the close of the survey, respondents were asked to provide their email address if they wanted to receive notifications of new release of GAP data, products, and other information. Seventy-one respondents provided an email address.

Nonresponse Survey

Because the survey sample included individuals who were not Federal employees, the survey had to be submitted to the information collection request process overseen by the Office of Management and Budget (OMB). OMB requires that any survey with a response rate less than 80 percent must have a nonresponse bias survey. The survey of GAP data users had an adjusted response rate of 35 percent; therefore, a nonresponse survey was required. A nonresponse survey is a brief survey sent to individuals who had an opportunity to respond to a survey but chose not to do so. The purpose of a nonresponse survey is to provide information to determine if those who did not respond to a survey are different from those who did. The nonresponse survey was sent to all individuals with valid email addresses who had received the GAP survey but did not respond, and who had not previously actively declined to participate by requesting removal from the survey list. The nonresponse survey opened on January 11, 2013, and closed on January 24, 2013.

The nonresponse survey was sent to 672 individuals. Two individuals had invalid email addresses. Five individuals requested to be removed from the survey sample, and two individuals were out of the office for the duration of the data-collection process. This left a potential sample size of 663. One hundred ninety-six respondents answered the nonresponse survey questions. The adjusted response rate was 30 percent.

The questions included in the nonresponse survey were taken from the original survey. The questions included in the nonresponse survey and the frequency of responses provided are presented below.

NRQ1 (Survey Q1) Which statement best describes your use of GAP data? (*n* = 196)

Response	Percent
a. I am using GAP data (either state, regional, or national data) at the present time, or have used it within the last five (5) years. (Respondents selecting this response were directed to NRQ3 next.)	**47**
b. I last used GAP data (either state, or regional) more than five (5) years ago. (Respondents selecting this response were directed to NRQ2 next.)	27
c. I am familiar with GAP data but have not used it. (Respondents selecting this response were directed to NRQ2 next.)	23
d. I am not familiar with GAP and believe I have received this survey in error. (Respondents selecting this response were directed to NRQ3 next.)	3

NRQ2 (Survey Q2) Which of the following is the most significant reason that you do not currently use GAP data? (*n* = 92)

Response	Percent
a. GAP data are not available for my area.	3
b. GAP data are not applicable to the work I'm currently doing.	**53**
c. GAP data are outdated.	8
d. I have concerns about the content of the land-cover data.	
e. I have concerns about the quality of the land-cover data.	10
f. I have concerns about the content of the predicted species distribution data.	

g. I have concerns about the quality of the predicted species distribution data.	
h. I have concerns about the content of the stewardship/protected areas data.	
i. I have concerns about the quality of the stewardship/protected areas data.	
j. GAP data are not compatible with the hardware that I use.	1
k. GAP data are not compatible with the other software packages I use.	
l. Lack of information on how to use GAP data.	7
m. Lack of support from my organization for use of GAP data.	7
n. I use data similar to GAP data but that is provided by a different source.	12

NRQ3 (Survey Q13) Which category best describes your organization? (*n* = 191)

Response	Percent
a. Private (for profit)	8
b. State	17
c. University	28
d. County	2
e. Municipal	2
f. Federal	**32**
g. Non-profit	9
h. Regional	
i. Tribal	
j. Other: [open-ended response]	2
Retired	
Recently retired Fed.	
Provincial	
Conservation partnership	

NRQ4 (Survey Q15) Which field most closely describes your current position? (*n* = 192)

Response	Percent
a. Ecology	**27**
b. Biology	4
c. Conservation	15
d. GIS	18
e. Land Use Planning	3
f. Fish and Wildlife Management	16
g. Land Management	4
h Other: [open-ended response] (*n* = 24)	13
Theme: Land-cover change (n = 2)	
Land Cover Change Analysis	
Land cover change + agriculture	
Theme: IT (n = 2)	
IT Management	
IT	
Theme: Education (n = 2)	
Education (2)	
No theme:	

Web programming (PHP/MySQL)	
Water quality monitoring	
University forest inventory research	
Technology Transfer	
Science Management	
Research	
Remote Sensing	
Regional Digital Library	
Program Coordination	
Geospatial analysis for wildland fire ecology and management	
Geomorphology	
Forestry	
Fish & Wildlife Biologist, GIS Program	
Federal Data Management	
Environmental Project Management	
Environmental Emergency Response	
Engineering	
Earth system sciences	
Data management	

NRQ5 (Survey Q23) With which geographic set of data are you most experienced or familiar? (*n* = 192)

Response			Percent
a. State:			**63**
Please select the state or U.S. territory for the GAP dataset with which you are most familiar: (*n* = 119)			
Minnesota	14	12%	
Florida	5	4%	
New York	5	4%	
Washington	5	4%	
Wyoming	5	4%	
Arizona	4	3%	
California	4	3%	
Colorado	4	3%	
Kentucky	4	3%	
New Mexico	4	3%	
Oregon	4	3%	
Alaska	3	3%	
Georgia	3	3%	
Iowa	3	3%	
Maine	3	3%	
Nebraska	3	3%	
North Carolina	3	3%	
Puerto Rico	3	3%	
Utah	3	3%	
Virginia	3	3%	
Wisconsin	3	3%	

Delaware	2	2%	
Hawaii	2	2%	
Idaho	2	2%	
Kansas	2	2%	
Michigan	2	2%	
Mississippi	2	2%	
Montana	2	2%	
Nevada	2	2%	
North Dakota	2	2%	
Ohio	2	2%	
Oklahoma	2	2%	
Pennsylvania	2	2%	
South Carolina	2	2%	
Alabama	1	1%	
Indiana	1	1%	
New Jersey	1	1%	
Vermont	1	1%	
West Virginia	1	1%	
b. Regional:			26
Please select the regional GAP dataset with which you are most familiar: (*n* = 47)			
Northwest	17	36%	
Southeast	17	36%	
Southwest	13	28%	
c. National:			12

NRQ6 (Survey Q33) With which type of GAP data are you most experienced or familiar? (*n* = 187)

Response	Percent
a. Land cover	**56**
b. Predicted Species Distributions	21
c. Stewardship/protected areas	5
d. Analysis (Land cover + Predicted Species Distribution + Stewardship/protected areas)	17

NRQ7 (Survey Q209) End question: Would you like to provide any other comments about the data provided by the Gap Analysis Program? [open-ended response] (*n* = 80)

Response
Theme: General positive comment (n = 12)
GAP landcover data has been invaluable to our work - particularly because it now provides relatively seamless coverage across state lines. This allows us to export tools developed for conservation in one state to other areas of the country.
When I was using GAP data, I was happy with it. The Land cover dataset was incredibly useful for deriving all kinds of other info.
Valuable data and very important to continue to collect and provide access to the public. I'm unfamiliar with the data quality and thus reluctant to use for county level analysis
Used MN GAP in many projects, it's an important data source
The data are extremely useful for a variety of analysis and serve as starting points for generating hypotheses that drive further research.
Keep up the good work.

It's a great resource!
I think the newer GAP data is a great improvement over the first version.
I retired in 2003 after 25 years as a Biology Professor. The GAP data at the State and Regional levels before then was very helpful in understanding distribution of the fungi I was researching.
I have been very impressed with the Gap Analysis Program and the land cover data that I've used in the past. Because my work tends to be focused on wildland fire rather than conservation, I generally use LANDFIRE data... but that doesn't mean I think it's necessarily better than GAP. I do use the GAP protected areas database (PAD v1.1) for land ownership information nationally, and for the most part I think it's great.
I found the GAP data to be very useful in my previous job, as a consultant calculating the Ecological Footprint of Utah. We needed land cover data for the renewable biocapacity calculations. See our final report, if you like, at *http://www.utahpop.org/vitalsigns/research/report_2007.htm*. Thank you!
Great stuff! Very useful for academic and conservation purposes!
Theme: Respondent's background or perspective (n = 9)
Perhaps improvements and updates have been made in GAP data of which I am not aware, and I might use it or develop projects that would involve use of the GAP data if I were more familiar with current products.
Not applicable to my program. Others in FWS use it
I retired 5 years ago and have little use for Gap data now.
I really know very little about this
I asked one of my staff who were more involved in the use of the GAP data to respond to your survey
I am not familiar with GAP data.
I am not familiar with gap analysis
I am "using them" only in that I am collaborating with another researcher that is using MNGAP data.
As the programs evolved, I became more involved with NBII than GAP per se, but continue to use both GAP-derived data and the central concepts of the GAP program in research, teaching, and graduate education.
Theme: Update needed (n = 8)
Would like to see updated species distribution maps every five years or so with new data
Very desperately needs a higher resolution redo for Hawai'i.
The program is invaluable. I hope funding continues so that the data can be periodically updated and/or improved.
Really like the Southeast GAP product, just wish it could be updated more frequently. This is a seminal data set for our analyses!
Need updates with more current land cover and more sophisticated species modeling given new technologies available.
My organization provided all the occurrence records used by GAP. More up to date land cover datasets would be very useful
Land cover data need to be updated thru time, as significant landscape change has been occurring in the Southwest over the last 12+ years.
Best land cover data I've worked with still, at least for the forested portion of the state. Need detailed cover down to tree species for much of my work. Would like to see updates to the Landcover. May want to partner with NLCD to capture what it seems to identify best, ag and development.
Theme: No comment (n = 8)
No (6)
None
n/a
Theme: Reason for not responding to earlier survey (n = 7)
Very helpful to have. Thank you! Sorry, I didn't fill out one earlier--crazy busy lately.
Sorry for not responding before. Been a very hectic year.....
Since I mainly use the data to help teachers answer questions about local wildife and may need additional assistance from our GAP and GIS staff I didn't take the time to answer the previous survey. I do not work with our data base

on a daily basis
My program was responsible for image and geospatial data processing and analysis for the NYS Gap Analysis Project. I am very familiar with GAP and the geospatial database. I thought I responded to your earlier survey. I apologize for not doing so. Great program but users seem to prefer NLDC land cover products rather than GAP land cover products. I don't have much experience with species distribution modeling products and how they are used in the academic, public, or private sector.
I am more of a GAP data developer than a GAP data user, which is why I did not respond to the original survey.
I am a manager of staff who use Gap products; that is why I did not respond previously.
GAP data is essential to conservation efforts. I have used land cover data for years as well as the protected areas database. I recently completed an update to PAD-US for Kentucky and was glad to have the opportunity to contribute. My previous non-response was because I have left the state agency where these emails were sent and believed another member of the data management team filled out the survey. I am not with a land trust and will subscribe under that email.
Theme: Reason for using alternate data (n = 5)
The GAP data served our needs at the time we used it to map land cover over a 3.3 million acre land base. However, we only used it once and adopted other datasets which I believe were trained or based in part on GAP data for LANDFIRE.
The Gap analysis was used for a document/program that assisted in developing County's comprehensive policies and goals. However, it was not integrated into the regulatory framework, therefore the data is not used widely by staff in permitting and review assessments.
In recent years my work and the work of my students has had a focus of larger geographic scale (smaller area at more detail) so we have used NAIP imagery for current land cover information for our models. GAP is excellent data for more broad studies, and especially useful if it includes both current and historical layers.
I think it's great data, it just doesn't fit my current research.
I believe GAP land cover is a great dataset, however, the thematic classes generated by GAP do not meet my research requirements.
Theme: What would be helpful (n = 4)
We use the national GAP stewardship classification as a guide to categorize local land stewardship. We occasionally refer to SWReGAP data, as well as other national, state and regional land cover data. There should be a national process for gathering information from local land management agencies about changes in stewardship; or if there is one, I'd like to know about it.
Regional, not statewide, GAP products would be most useful.
Please develop a program to provide national land cover data every 5 years. GAP land cover is the most important data because it is used by the most people. States and other groups are now creating land cover data because GAP stopped, and those other data are often not consistent in classification schemes and methods. Relying on states and other groups to figure out how to provide regional maps is far less effective and less efficient than if GAP was providing this service nationally.
Desktop tools to display GAP data are needed. Use of GAP data must not require advanced GIS skills, must be user friendly. Periodic updates (e.g., quarterly) on what GAP data are available. Provide examples of how GAP data are being used in natural resource management.
Theme: Comments about errors in or accuracy of data (n = 4)
The data provided by Iowa's GAP was the first comprehensive look at species distribution for almost all of Iowa's terrestrial vertebrate species. For many species, the data points used to determine distribution were often not current, but the information still allowed an informed interpretation of where each particular species might still be found. Based on my 35 years experience in the field, it seems the predicted range for most species was very accurate.
I think GAP is invaluable data! I appreciate that we continue to update it and improve its accuracy. I'm hoping that we continue to work on the land cover data (i.e., improve Columbia Basin shrub-steppe).
I have used gap for Burned Area Emergency Response (BAER) assessments in Nevada, California, New Mexico, and Utah. I have found that it is many times inaccurate and I have had to tweek data in our BAER reports to reflect what is actually on the ground. CA gap sucks

Gap data is in the foundation of the LANDFIRE program. I look forward to the day when these various data and the derivations are dependable. I really appreciate having national wall-to-wall data for regional analysis projects. Thank you for your foresight.
Theme: Outreach/cooperation (n = 3)
For federal folks, collaboration on Land Cover between GAP and LANDFIRE would be most beneficial. LANDFIRE is our default source for fire related analysis but GAP input could likely improve the land cover, especially in the Southeast United States.
The greatest utility of the GAP data is now being made through a joint USGS/EPA effort to create a national level product entitled the Enviro Atlas. The GAP deductive models have been grouped into functional groups that represent ecosystem services. The first national deployment of the Atlas is scheduled in September 2013. This effort will significantly elevate the prominence of the GAP models, and subsequently the GAP Program. I suggest you contact Kevin Gergely or Alexa McKerrow to learn more. Collectively, the joint agency effort will be a game changer.
The data is extremely useful. However, I don't see it marketed as much as I would like, and having easy online query tools could greatly enhance it's use. E.g. there is enough data there to provide any user at any location a habitat typing and a list of vertebrate species likely to be found. Why not partner with Google or the mobile application market to really get this data out there and in the hands of not just land managers, but the general public?
Theme: More useful data available (n = 3)
I did not know the GAP program was still active. With greater local data and GIS software availability I have been relying upon GAP like analyses on our land system using local data and ESRI's ArcGIS.
Florida has relatively high-precision, high quality land cover data in the Cooperative Land Cover (CLC) dataset maintained by Florida Natural Areas Inventory with collaboration by Florida Fish & Wildlife Conservation Commission.
Florida has other higher quality land cover and species distribution information that are the standards for conservation use in the state
Theme: Negative comment regarding land-cover data (n = 3)
The Gap program data is too coarse in its categories of land cover and because of that and inherent low resolution lacks the precision to be truly useful in operational forest or wildlife management...and related research.
The consensus is that the GAP land cover produced for Ohio was a complete and total failure, with millions of dollars wasted.
I have struggled with various land cover maps none of which seem to have data at the resolution that I need.
Theme: Aquatic data (n = 3)
My impression from exposure to the Iowa aquatic GAP analysis products is that the predictor variables were quite generalized and did not inspire a lot of confidence in the model's ability to predict fish species occurrence. The data used to develop the models is now outdated, in the sense that it does not include fish survey data from the past 10 years or so.
Initially the NY Aquatic Gap program of USGS Cortland had been promoted as a capability that biologists could use in their office. In NY that hasn't happened, but the program supervisor has extracted data and made it available in a project last year. That is my limit of direct, personal involvement.
I am most interested in aquatic species information. I'd like to see more modeling and datasets for aquatic systems.
Theme: Comment about the survey (n = 3)
I stated earlier that I do not use GAP data but could not complete the survey unless I gave some response as to use and familiarity of the data. These should have been blank for me - I was involved in GAP in a variety of ways - but never a user. The data seem to over [sic] wonderful potential - I would like to see the three components continue as they provide a comprehensive view of conservation in the US.
As a high level administrator I don't deal directly with GAP data anymore, my staff does. Your survey doesn't allow me to answer in context with my position versus the usefulness of the information to the agency.
I did not complete this survey because I am the office director/administrator and forwarded the survey to my data manager who as I recall responded to the survey. I only know we have used GAP data in the past and assume we still use it. I did not forward this email to my data manager because directions said not to. Seems you should have

had a question about whether recipient is the right target/person.
Theme: How GAP data were used (n = 2)
I have used the landcover data for developing logistic regression models for species distribution in R and ArcGis.
I have used gap analysis and its data in a conceptual way in reports to two federal agencies - suggesting that they need to use gap data in their analyses to prioritize future conservation areas.
No theme:
In Maine, the most significant problem was that the actual data was not available; there were summary reports. The actual data was to be published prior and the timeframe was unworkable for on the ground conservation planning and implementation needs of our agency. We were able to access GAP gis data for use in other States.
Up-to-date land cover data is still an important need for our state, however given the age of the GAP project data in our state (MN) the usefulness of GAP for this purpose is limited. The species distribution data has been of limited use as far as I can tell, for MN. The Stewardship component is poor, and was out of date before it was even published. In MN the GAP project was essentially seen as a means to get a Land Cover dataset by the DNR Forestry division. Our DNR Natural Heritage Program and our County Biological Survey Programs and Wildlife Programs were already mature and not interested in the data produced from the GAP process. They were already taking a much more detailed approach. Now the MN GAP data is over 15 years old and of little use except for time-change analysis. NLCD has become the Land Cover dataset of record, and the DNR is in the process of completing and consolidating its native plant community inventory GIS.
The stewardship layer has been the most useful layer long term. Landcover was used extensively until other current datasets replaced it. PSD was the most marginal dataset for usefulness
The Predicted Species Distributions was too general to be very useful for anything but very general planning. Stewardship/protected areas was so out-of-date it was not useful. BLM had much better data.
Just waiting for ReGAP
It's too coarse to be useful for most of our applications, so we rarely use it, although as a last resort it's better than nothing.

At the close of the nonresponse survey, respondents were asked to provide an email address if they wanted to receive notifications of new release of GAP data, products, and other information. Sixty-one respondents provided an email address.

Limitations to Report

This report to respondents provides a preliminary summary of the results of the survey regarding the use of GAP data. Although the frequencies of responses and the average response for the questions are useful information, these summary statistics do not constitute complete analyses of the survey data.

Acknowlegments

This study was requested and funded by the Gap Analysis Program of the USGS. We appreciate the opportunity to conduct this research. We thank the individuals who took the time to respond to our survey. Two reviewers provided helpful feedback on a draft of this report: we thank Dr. Clifford Duke, Director of Science Programs at the Ecological Society of America, and Dr. Mary Barber, Senior Research Environmental Scientist at RTI International.

Reference Cited

Ratz, J.M., and Conk, S.J., 2014, Review and bibliometric analysis of published literature citing data produced by the Gap Analysis Program (GAP): U.S. Geological Survey Open-File Report 2013–1294, 117 p., *http://dx.doi.org/10.3133/ofr20131294*.

ISSN 2331-1258 (online)
http://dx.doi.org/10.3133/ofr20141166