



# Universal Field Guide (ufg) – Philosophy and Use

Eduneer, LLC  
 Greg Sepesi  
 2009 June 12

- Background ..... 2
- Overview – What’s the Difference? ..... 2
- Part 1. The User Interface..... 3
  - 1.1 Lists ..... 3
  - 1.2 Icons ..... 3
  - 1.3 Checks ..... 4
  - 1.4 Sort Values..... 5
  - 1.5 Navigation ..... 5
- Part 2. The Ordinary Features ..... 6
  - 2.1 Looking up Species Information ..... 6
  - 2.2 Illustrations ..... 7
  - 2.3 Distribution ..... 7
  - 2.4 Species Accounts..... 8
- Part 3. The Extra Features ..... 8
  - 3.1 Statistics ..... 8
  - 3.2 Information Theory ..... 8
  - 3.3 Updates..... 9
  - 3.4 Collaboration ..... 9
- Part 4. The Species Inventory ..... 10
  - 4.1 Sighting File Names ..... 10
  - 4.2 Sighting File Format..... 10
  - 4.3 GPS Receiver Setup ..... 10
- Part 5. Example Uses ..... 11
  - 5.1 Identification ..... 11
  - 5.2 Reference ..... 11
  - 5.3 Sighting Log ..... 11
  - 5.4 Training ..... 11
  - 5.5 Research ..... 11
- Conclusion ..... 11
- Appendix ..... 13
  - Appendix A. Installation and Setup..... 13
  - Appendix B. Quick Find ..... 14
    - Quick Find Guidelines ..... 14
    - Quick Find Exercise ..... 15
  - Appendix C. Check Please..... 15
    - automation..... 15
    - document search ..... 16
    - favorites..... 16
    - reports..... 16
    - scroll ..... 16
  - Appendix D. Link Token File ..... 16
  - Appendix E. Tips and Tricks ..... 17
  - Appendix F. Change Log ..... 17

Copyright © 2009 Eduneer LLC.  
 Permission is granted to copy, distribute and/or modify this document under the terms of the GNU Free Documentation License, Version 1.2 or any later version published by the Free Software Foundation; with no Invariant Sections, no Front-Cover Texts, and no Back-Cover Texts. A copy of the license is available at <http://www.gnu.org/licenses/fdl.txt>

## Background

Tens of millions of smartphones are discarded every year. Many of them could be diverted from landfills and turned into extraordinary electronic field guides. Unfortunately, no one knows how to do that yet. Although dozens of electronic field guide applications have been written, users have consistently preferred paperback field guides.

Eduneer LLC, started in March 2005, is based upon the general idea that electronic field guides should be like paperback field guides in price but not design. The design, instead, should focus on the strengths of electronically stored information:

- flexible organization,
- storage capacity, and
- collaboration.

The Peck bird information manager was a first-generation application from Eduneer LLC, and it demonstrated **flexible organization**. Prior electronic field guide applications mimicked the organization of paperback field guides, collecting species information into species summaries. In contrast, the Peck bird information manager application scattered species information across several lists (e.g., classification, photo, audio, geography) and used a highlight to maintain the context when users switched lists. For example, highlighting the Northern Cardinal in the classification list and switching to the photo list resulted in an automatic highlight of the Northern Cardinal in the photo list. The design is good for development because the task of adding more field guide information is simply the task of adding items to lists. It turns out the design is good for users too: of the 1500 posts to the Peck bird information support group, not one was about the lack of species summaries.

The universal field guide is a second-generation application from Eduneer LLC, building upon the flexible organization methods developed in the first-generation. Containing all the information from the Peck bird information manager, the universal field guide is designed to demonstrate the advantages of increased **storage capacity** and easy **collaboration**. Similar to the approach taken in the first-generation, the implementation of the universal field guide will be iterative with frequent releases. If you are interested in occasionally trying out the latest version of the universal field guide and talking about how to improve it, join the universal field guide users group at <http://groups.google.com/group/ufgu>.

## Overview – What’s the Difference?

Most bookstores have hundreds of paperback field guides about dozens of topics. Small and cheap and informative, paperback field guides are great products. People know what to expect, and paperback field guides are mature products that deliver.

In their book ‘Birding Essentials’ [2007, ISBN:9781426201356, p.28], Alderfer and Dunn describe the similarities of paperback field guides.

“Field guides are by definition portable and compact, so valuable information sometimes has to be edited or even omitted. Most field guide authors (and experienced birders) agree on what information is most important, so there are many similarities among field guides. The main differences are in the quality and effectiveness of the visual presentation, the writing style and interests of the author, and the geographical scope of the guide.”

The universal field guide is different from Alderfer and Dunn’s description in two important ways.

- **The geographic scope is continental.** Due to the increased storage capacity, the universal field guide is not limited to covering just the species occurring in a portion of a continent (e.g., Northeastern United States).
- **The included information is extensible.** Again, due to the increased storage capacity, the included information in the universal field guide depends more upon the interests of the user rather than the interests of the author.

Because paperback field guides are widely known and the universal field guide (ufg) isn’t, this manual is organized to compare the two. The first part of this manual briefly describes the user interface. It is only a brief description because the best way to become familiar with the universal field guide application’s user interface is to use it.

The second part of this manual describes the similarities between the well-known features of paperback field guides and some features of the ufg (universal field guide). Each feature comparison

- starts with some quotes from Alderfer and Dunn’s “National Geographic – Birding Essentials” [2007; ISBN:9781426201356] describing the feature from the perspective of a paperback field guide user, and

- ends with a description of the feature from the perspective of a ufg application user, and a general explanation of why the implementation is as it is.

The third part of this manual describes the features in the ufg application that have no equivalent in paperback field guides.

The fourth part of this manual describes the species inventory application, which integrates with the universal field guide as a way for users to log information about species they have sighted.

The fifth part of this manual gives a few general examples of the universal field guide capabilities.

Relegated to the appendix are most of the included details about how to use the ufg application features, ordered according to how frequently the features are discussed in the ufg users group.

## Part 1. The User Interface

### 1.1 Lists

In essence, the ufg application is seven integrated lists.

- **The classification list** shows a hierarchical classification of the species.
- **The photograph list** shows the photographs available.
- **The audio list** shows the recordings available.
- **The video list** shows the videos available.
- **The attribute list** shows the species attributes available. There are two types of species attributes: sets that are simply a list of species with a particular attribute, and value ranges that are a list of species each associated with a minimum and maximum value. For example, being an introduced species is a set attribute, and clutch size is a value range attribute.
- **The custom checklist list** shows the custom checklists available. Examples of custom checklists, in a field guide on the topic of North American birds, are checklists from state/province record committees. Most states/provinces have a set of volunteers that form a bird record committee to keep track of rare species sightings and maintain a checklist of species that occur in that

state/province. Those checklists from the bird record committees are typically freely available online and are an important resource to avid birders.

- **The geography list** shows the localization options available. The species shown in the classification list typically do not occur throughout the entire continent. The geography list enables users to focus on species that occur in a particular region, such as where they live. For example, the North America Conservation Initiative (NABCI) has defined 66 Bird Conservation Regions (BCRs) covering North America. Many bird information sources, such as the eBird sighting statistics from the Cornell Lab of Ornithology, are available partitioned according to the Bird Conservation Regions. The ability to localize means that ufg can offer local AND continental coverage.

### 1.2 Icons

At the bottom of the classification list is a documentation toolbar with a series of capital letter icons. When a species is highlighted in the classification list, the icons in the documentation toolbar show which documentation is available for the highlighted species. Entering that capital letter launches the associated documentation.

- ‘A’ for Audio – At least one audio recording is available.
- ‘D’ for mitochondria DNA sequence – At least one sequence of the species is available.
- ‘E’ for Etymology – Etymology entries about the common name and the scientific name are available.
- ‘I’ for Identification tips – Tips for identifying the species are available.
- ‘L’ for Life history description – A brief description of some life history details of the species is available.
- ‘M’ for distribution Map – An animated distribution map, showing migration patterns, is available.
- ‘N’ for Notes – Some user written notes about the species are available.
- ‘P’ for Photo – At least one photograph is available.
- ‘V’ for Video – At least one video is available.
- ‘X’ for auxiliary text – An auxiliary text file (e.g., Wikipedia article) is available.

In the title bar of the classification, photo, audio, and video lists, there are two more buttons:

- a guide topic button that displays the list of installed field guide topics, and
- 'O' (for sort Order) that displays the available sort order options.

It is worth noting that capital letter icons work for both touchscreen and keypad users. When using a keypad, you enter a capital letter icon by typing it. When using a touchscreen, you enter a capital letter icon by tapping it.

It is also worth noting that entering a lower case letter causes lists to scroll to the matching text, and entering a number causes the list to scroll to the matching item number in the list.

### 1.3 Checks

The seven lists in the ufg application are highly integrated. For example, in the birds of North America topic, there are currently more than 320,000 links between the lists. Links are associations between lists established during the initialization of the ufg application. For example, the association of a species in the classification list with a particular photograph in the photo list is one link. Another link is the association of a species in the classification list to the definition in the geography list that the species occurs during a particular week of the year in a particular region.

This level of integration in field guides is simply not possible in paperback field guides and users have quickly seen the advantage.

- "The more I use your software the more excited I am to use it."
- "I got it working - and all I gotta say is WOW!!!! Very nice ..... and for the price it is incredible!!!!"
- "Thanks for this excellent program."
- "This is the bird guide I have been waiting for."

Checks are the mechanisms for the ufg list interactions, and projections are how check information is transferred over the links. As an example of a common projection, to see which species are currently in your area,

- check your area(s) in the geography list,

- switch to the classification list, and
- project the checked area(s) from the geography list to the classification list by selecting the 'check/project' menu item, checking 'from geography / season list,' and tapping the 'OK' button.

There are not a lot of rules or exceptions to remember when projecting checks. However, here is a collection of some check projection trivia.

- Check projections can be one to many. For example, one area in the geography list maps to many species in the classification list.
- Check projections can be many to one. For example, several photos in the photo list can be of the same species and therefore map to just one species in the classification list.
- Implied in the 'check/project' menu item is an initial clearing of the destination list's checks, and the use of the 'or' set logic on the first set being projected followed by the use of the 'and' set logic on all subsequent sets being projected. For example, to determine which species currently in your area have been introduced, check 'AOU status / introduced' in the attribute list, check your area(s) in the geography list, switch to the classification list, select the 'check/project' menu item, check 'from attribute list' and 'from geography / season list', and tap the 'OK' button. The result will be the species that are currently in your area AND that have been introduced.
- If you don't want to initially clear the checks in your destination list or if you want to control the set logic, use the 'check/projection logic' menu item instead of the 'check/project' menu item. (It may be helpful to think of the 'check/projection logic' menu item as a manual transmission and the 'check/project' menu item as an automatic transmission in that the 'check/project' menu item is generally sufficient, but the 'check/projection logic' menu item offers a lower level of control.) An example of when the 'check/projection logic' menu item is needed rather than the 'check/project' menu item is the determination of which species currently in your area eats seeds. The lower level of control is needed because in the attribute list there is a 'diet / seeds' item and a 'diet-secondary / seeds' item that are exclusive (i.e., no species occurs in both sets). Therefore, the default 'and' set logic of the 'check/project' menu item would always result in zero checks.

## 1.4 Sort Values

The classification, photo, audio, and video lists have an 'O' (for sort Order) icon in the title bar. In the left column of each of these lists is space reserved for sort values (i.e., the values used to sort the list) that appear according to the following rules.

- Not every sort order option will display sort values. For example, the incrementing hierarchical classification order (i.e., the default sort order) does not display sort values because they are simply consecutive element numbers and element number information is already given in the title bar.
- Even if a sort order option displays sort values, some species may have a blank sort value. For example, sorting the species according to their annual brood count currently displays the annual brood count for 518 of the 2048 species in the birds of North America. The other species have blank sort values because their brood count data has not yet been added to the birds of North America topic text.
- Even if a sort order option displays sort values and a species has a sort value available, the sort value may not be displayed completely. In order to display a lot of species information on a small screen, ufg allocates only two digits to display the sort values. Although two digits are often enough to display the entire sort value, some sort order options result in much larger sort values. When the sort value does not fit in the two-digit display area, the ufg application displays an asterisk followed by the sort value's order of magnitude. For example, selecting the 'global population estimate avg' sort order option, results in a '\*8' as the House Sparrow's sort value, meaning that the order of magnitude of the average global population estimate is  $10^8$  (i.e., 100,000,000). If you want to see the complete sort value in a report, rather than just the order of magnitude on the screen, check the species of interest and select the 'select/create list report' menu item.

## 1.5 Navigation

Although many users quickly figure out how to navigate through the ufg application by exploring its user interface, here is a collection of tips that could make navigation faster

- **switching between field guide topics** – While using a touchscreen, tap the guide icon next to the "ufg" in the title bar to bring up the list of installed field guide topics. While using a keypad, type a capital 'F' (for Field guide topic) to bring up the list of installed field guide topics. Once the list of field guide topics is displayed, highlight the topic of interest and tap the 'OK' button.
- **switching between lists** – While using a touchscreen, the list selector in the bottom left of each list is a convenient way to switch to another list. While using a keypad, the 'go' menu item is a faster way to switch to another list.
- **scrolling to a species name in a list** – To scroll to a particular species, start entering a part of the species name in lower case. It is not necessary to start at the beginning of the name. In fact, starting at the last letter of the first word typically requires entering fewer characters. Details about scrolling to species names are in the appendix (see 'Quick Find').
- **scrolling to the next checked species in a list** – Checks can be sparsely distributed throughout lists. Rather than paging through a list looking for the next check, press the left or right side of your device's five-way navigation button, to scroll the highlight to the next checked species. If your device doesn't have a five-way navigation button, use the 'view/previous check' and 'view/next check' menu items. (Note that a species must be highlighted to get this scroll highlight to next checked species behavior.)
- **scrolling through photographs** – A species can have many (256) photographs included. When viewing a photograph of a species, you can switch to other photographs of the same species by pressing the top or bottom side of your device's five-way navigation button. If your device doesn't have a five-way navigation button, use the 'view/previous photo of species' and 'view/next photo of species' menu items.

To switch to the photograph of the next/previous checked species, press the right/left side of your device's five-way navigation button. If your device doesn't have a five-way navigation button,

use the ‘view/next checked species’ and ‘view/previous checked species’ menu items.

When using a touchscreen, you may find it convenient to navigate between photographs by tapping within them (e.g., tap right side of photograph to switch to a photograph of the next checked species). To do that, check the ‘tap photo to navigate’ option in the ‘select/photo display options’ menu item.

It may be helpful to visualize the photographs in stacks on a conveyer belt, where each species has its own stack of photographs. In this mental image, the up and down sides of the five-way navigation button traverse through the stack of photographs of a particular species, and the left and right sides of the five-way navigation button traverse the conveyer belt to another stack of photographs (of a different species).

- **playing multiple recordings** – A species can have many recordings (256) included. If you tap the ‘A’ (for Audio) icon, ufg will play all the recordings of the species. In general, the longer and more complicated vocalizations (e.g., songs) are played before the shorter and less complicated vocalizations (e.g., calls). When ufg plays multiple recordings, the progress bar in the title bar resets at the beginning of each recording. When playback has finished, the progress bar resets. (Because some recordings contain several seconds of silence, watching the progress bar is the way to know for sure that the recording playback has stopped.)

If a species has several recordings and you want to play just one, switch to the audio list and highlight the recording of interest and play it (by tapping the already highlighted recording, or by pressing the center of the 5-way navigation button).

## Part 2. The Ordinary Features

### 2.1 Looking up Species Information

Field guide organization is important because it affects how quickly users can find species information. The “key” to the success of many paperback field guides has been their organization.

For example, Lawrence Newcomb’s ‘Wildflower Guide’ quickly became popular, and remains so, due to its easy-to-use three number key (i.e., flower type, plant type, leaf type) that organizes the included wildflower species into the guide’s “plant groups”.

However, one organization rarely suits all and, because their pages cannot be rearranged, paperback field guides are physically constrained to just one organization. Alderfer and Dunn wrote quite a bit about field guide organization.

“The best field guides do not organize species from the front to back by color, or size, or habitat. Almost all field guides are organized in a similar fashion, based on taxonomy, following a scientific system of classification based on evolutionary relatedness. Similar species are grouped together because they share more recent common ancestors on an evolutionary time scale, not because they look similar. This is not an intuitive system, especially the sequencing of families from front to back. Become familiar with the sequence of families and know generally where they occur in your field guide to use it efficiently.”

“Many beginners ask, ‘Why don’t they arrange field guides by color? That’s what I see first and what’s most important to me.’ In chapter 2, we touched on why all the best field guides are arranged taxonomically with related species shown together. Briefly, there are so many variations within each species and among closely related species – between males and females, between different ages, between different times of the year – that arranging them by color would result in chaos. Not only would closely related species often be found sections apart, but birds with equal amounts of different colors would also get arbitrarily assigned to one or another group, and males and females would often get separated.”

Unlike paperback field guides, the ufg application does not have a fixed organization. There are no keys. Lists are sorted at the whim of users. Therefore, it is indeed possible to “organize species from the front to back by color, or size, or habitat” or any number of attributes. Being keyless is the fundamental reason why the ufg application can include any field guide topic.

Specifically, there is a two-step process to grouping species together in the ufg application’s classification, photo, audio, and video lists.

- 1) Check the species of interest (e.g., use the ‘check/project’ or ‘check/projection logic’ menu

items to project checks from other lists, such as the attribute or geography lists),

- 2) Sort the list in check order (by tapping the 'O' icon, selecting the 'check order,' checking 'dec,' and tapping the 'OK' button).

Details about checking species are in the appendix (see 'Check Please').

It is worth noting that while paperback field guides are physically constrained to just one organization (because their pages cannot be rearranged), they typically include an alphabetically ordered index, which is in essence a second organization. So the typical paperback field guide has two sort orders: page order and alphabetical order. In contrast, the birds of North America topic has about 40 sort orders.

## 2.2 Illustrations

Alderfer and Dunn wrote that they prefer paintings over photographs.

“Illustrations are the heart of any field guide. Although beginners are drawn to photographic guides, most experienced birders agree that painted illustrations work best. A photograph depicts an individual bird during a single instant of its life and, as a result, may show a bird in an unnatural position or with confusing shadows, backgrounds, and color shifts – making comparisons to other species difficult. A successful illustration simplifies confusing details and presents an image that better matches a birder’s experience of the species in the field.”

Although ufg images can be either photographs or painted illustrations, to date all of the included images have been photographs. Alderfer and Dunn’s comment that a photograph could “show a bird in an unnatural position or with confusing shadows, backgrounds, and color shift” is, of course, true. However, a general principle of the ufg is that updates occur early and often. The quality of the included photographs keeps improving and so does the quantity. Many photographs of the same species can be included (presently the limit is 256) so the ufg application is able to display both genders and a variety of ages of each species.

## 2.3 Distribution

Alderfer and Dunn described the importance of the distribution information included in paperback field guides.

“One of the most important aspects of birding, relevant to birders of all experience levels, is understanding status and distribution – where and when birds are found and how common or rare they are at different seasons. Many birders are tempted to think that any species can turn up at any time and in any place. Although strays and unseasonable records do frequently appear, let us focus first on what is normal. Birds are remarkably predictable within the known and established limits of status and distribution.”

Typically, the distribution range maps in paperback field guides use colors to identify the location of the species during different seasons. For example, a blue area on the distribution range map could represent where the species is during winter and a red area on the same map could represent where the species is during summer.

The universal field guide offers a broader perspective about distribution.

- See the big picture of distribution with the map of North America animating a year of weekly sighting statistics for 1139 species.
- For a local seasonal perspective, select your Bird Conservation Region and see the seasonal distribution timeline drawn in the margin of the photographs of 1139 species.
- For a perspective across species, sort them according to how often they are sighted in your Bird Conservation Region during the current week of the year.

To see the distribution range on the **map of North America**, tap the 'M' (for distribution Map) icon in the classification list’s document toolbar. The colors in the map denote the likelihood of sighting the species. The distribution range map color key is the same as ribbon awards: blue is first place, red is second place, and yellow is third place. Splitting each color into dark and light shades gives six levels.

- 6. dark blue – most likely to see (> 32%)
- 5. light blue (16% to 32%)
- 4. dark red (8% to 16%)
- 3. light red (4% to 8%)
- 2. dark yellow (2% to 4%)

- 1. light yellow – present but least likely to see (1% to 2%)

To see an animation of how the distribution changes throughout the year, tap the play icon in the distribution range map's title bar.

To see the local seasonal **distribution timeline** in the margin of photographs, select any photograph's 'select/photo display options' menu item, and set the 'display distribution timelines' value as follows:

- 1 – enable the display of the distribution timeline of the displayed species.
- 2 – enable the display of the distribution timeline of the displayed species as well as the distribution timeline of a species marked as favorite in the photo list. This option allows a side-by-side comparison of the distribution timeline of different species.

The thickness of the timeline denotes the likelihood of sighting the species at that time of the year. For ease of reading, the distribution timeline is drawn symmetric about the time axis. To associate the timeline thickness with a probability, count the number of line widths from (and including) the center.

- 7 line widths – 64% to 100%
- 6 line widths – 32% to 64%
- 5 line widths – 16% to 32%
- 4 line widths – 8% to 16%
- 3 line widths – 4% to 8%
- 2 line widths – 2% to 4%
- 1 line width – 1% to 2%

To see how local seasonal sighting statistics vary across species, tap the 'O' (for sort Order) icon and select 'seasonal sighting statistics'.

## 2.4 Species Accounts

Alderfer and Dunn describe the scarcity of species account information in paperback field guides.

“Most modern field guides present text, range maps, and illustrations together on the same page or two-page spread. This is the most convenient arrangement for quick reference, but the downside is that there is very limited space for text. As a consequence, most species accounts are terse presentations of the most important field

marks, including voice, with short descriptions of status and distributions. There is not room for much, if any, information on behavior, habitat, nesting, migration, or other life history details, although you will find that there are innumerable good references on such subjects.”

In contrast, the ufg application has much more storage capacity. Any number of attributes, such as “information on behavior, habitat, nesting, migration, or other life history details” can be included by simply adding that information to the topic text directory on your SD card.

Details about the topic text directory are in the appendix (see 'Setup and Installation').

## Part 3. The Extra Features

### 3.1 Statistics

In the birds of North America topic, the sighting statistics are from eBird (at [www.ebird.org](http://www.ebird.org)) and based upon the millions of sighting reports submitted to them. The ufg application's classification, photo, audio, and video lists have an 'O' (for sort Order) icon in the title bar. Tap the 'O' and select 'seasonal sighting statistics order' to sort the list according to eBird sighting statistics for the current week of the year. Note that it is helpful to check 'dec' (i.e., decrement) when sorting by sighting statistics so that the most frequently sighted species are listed first.

There may be times when you want to combine statistics across several geographical regions or across a whole year. There are some simple ways to sort by combined sighting statistics.

- To sort species by the maximum value of their seasonal sighting probabilities throughout the year, tap the 'O' and select 'sighting statistics order' (rather than 'seasonal sighting statistics order').
- To sort species by the maximum value of their sighting statistics across multiple regions, first check the multiple regions in the geography list.

### 3.2 Information Theory

Every species has its own interesting story and is uniquely qualified to fill its position in the ecosystem. The ufg application can generate species summary reports (use the classification list's 'select/create species report' menu item) that employ information theory to help show what makes each species special. In the report, the included

information about the species is sorted according to its information value. For example, an attribute that occurs in just one of every 32 species has an information value of 5 bits (i.e.,  $I = -\log_2(1/32)$ ). The rarer the attribute, the greater the information value.

### 3.3 Updates

One of the potential advantages of electronic field guides is that they can be easier to update than paperback field guides, and that becomes more important as changes become more frequent. In the 47-th supplement to the American Ornithologists' Union (AOU) checklist published in July 2006, the AOU wrote

“Changes of classification of entire genera, tribes, subfamilies, and even families will become more frequent as DNA evidence continues to provide new or confirm old concepts of relationships.”

However, there are plenty of examples of out of date electronic field guides because updates are complicated, involving all the components of an electronic field guide, including license agreements, pricing, support, distribution, and software design.

Efficient updates are part of the design of each component of the universal field guide. It is expected that the multimedia will get updated about once per year, the application will get updated about once per month, and the topic text will get updated about once per week (when user collaboration on topic text starts). Efficiency comes from updating only the parts that change.

- **differential update of application** – There are some application updates that only affect the executable portion of the application and not the application's databases (i.e., the .prc and not the .pdb files). For those cases, a copy of the .prc is distributed and can be installed while keeping the previously installed and initialized databases, including your application preferences. For all other application updates (i.e., when no .prc file is distributed), you should assume that the database design has changed, and you should delete the previously installed application (using the Palm OS application launcher's 'App/Delete' menu item) before installing the new application by running the distributed application installer (e.g., ufg-

Installer.prc or si-Installer.prc).

- **differential update of multimedia** – The multimedia is hundreds of megabytes of data and can take hours to download even over a fast Internet connection. However, if you already have a copy of the multimedia and the multimedia encryption hasn't changed (e.g., due to switching to a new SD card or due to the use of a new encryption implementation), you can setup your FTP client application to compare multimedia filenames and download only the new multimedia files. It is worth noting that according to the ufg multimedia file naming convention, new multimedia files are ensured to have a new name, and this allows filename comparison to be used as a quick way to determine which multimedia files are new.
- **differential update of topic text** – Because the topic text is distributed in a zipped file, there is no differential download available for the topic text. Also, because the ufg topic text file naming convention does not change the filename when the file contents change, it is not possible to determine which files have changed by comparing filenames. However, you can delete your previous copy of the topic text, unzip the new copy to your PC, and run the ufgdu Windows application to copy only the changed topic text files to your SD card.

See the download instructions and the copy instructions at <http://www.eduneer.com/ufg> for more details about multimedia and topic text differential updates.

### 3.4 Collaboration

One of the advantages the universal field guide has over paperback field guides is that it can be used as an input device for data such as species attributes, which can be used as identification keys. In the universal field guide, there are two types of species attributes:

- **sets** – a list of species with a particular attribute, and
- **value ranges** – a list of species each associated with a minimum and maximum value.

For example, being an introduced species is a set attribute, and clutch size is a value range attribute.

To input a species attribute,

- switch to the classification list,
- clear all checks (by selecting the 'check/clear all' menu item),
- check the species that have the attribute you are documenting,
- select the 'select/create list report', enter a name for the attribute (which will be the basis for the created attribute filename), check 'topic text', tap the 'OK' button,
- link to your newly created species attribute file (by selecting the 'select/link' menu item), and try it out (e.g., with check projections, etc.).

If you think your species attribute file might be helpful to others, consider sharing it (by posting it to the 'Files' section of the universal field guide users group). After a little testing by the group, your species attribute file will be added to the topic text distribution. The educational value of the guide increases with each added species attribute. So if there is an undocumented species attribute that interests you (e.g., which species have females that sing), do a little research and document it for your sake and others'.<sup>1</sup>

## Part 4. The Species Inventory

The species inventory (SI) application is an optional application that integrates with the universal field guide application for users who like to log their sightings. In essence, SI is a data entry form that writes your sighting information to text files in comma separated value (i.e., .csv) format in your SD card's /ufg/sighting directory. Although SI is not an editor, you can use any text editor or spreadsheet application to edit your sighting files.

### 4.1 Sighting File Names

The sighting file name convention is simple:

- the site abbreviation you define,
- an underscore,
- the observer abbreviation you define, and
- the .csv extension.

---

<sup>1</sup> Not only other universal field guide users, but also users of field guides developed by others because all of the universal field guide species attribute data is distributed in plain text and with a GNU Free Documentation License (FDL).

For example, I have a sighting file named BWC\_GS.csv, denoting that the site is Blackwater Creek and the sightings were observed by Greg Sepesi.

Each sighting file is dedicated to the sightings of one observer at one site. If you have several sites of interest and you trade sighting files with other observers, you can easily accumulate dozens of sighting files in your SD card's /ufg/sighting directory and you can see them in SI's file roster by selecting the 'go/file roster' menu item.

### 4.2 Sighting File Format

Each sighting file is a spreadsheet storing each sighting's information in a single row with the following fields.

- DATE/TIME – sighting's timestamp
- LNG – longitude of observer
- LAT – latitude of observer
- DIST – distance from observer to specimen
- DIR – direction from observer to specimen
- TILT – inclination from observer to specimen
- SITE – abbreviation of sighting site
- OBS – abbreviation of sighting observer
- ID – identification method (e.g., 'V' for visual, 'A' for audible)
- GRP – abbreviation of sighting group (e.g., 'bbs' for Breeding Bird Survey)
- TOPIC – field guide topic (e.g., bird)
- # - number of specimens (e.g., 1)
- COMMON NAME
- SCIENTIFIC NAME
- COMMENT

Because most of the fifteen fields are filled in automatically, you can spend more time looking at birds and less time looking at a screen.

### 4.3 GPS Receiver Setup

If you connect a GPS receiver to your Palm OS device with a cable, you should verify that the cable connection is correct by installing and running the free Palm OS application called MiniTerm (available at <http://www.palmgear.com/software/showsoftware.cfm?prodid=8865>). The advantage to using MiniTerm to test the cable connection is that it provides quick visual feedback, showing the NMEA messages transmitted from your GPS

receiver.<sup>2</sup> Once you are satisfied that the cable connection is okay, run the SI application and select the site list's 'Select/GPSR Setup' menu item to setup SI's connection with your GPS receiver.

Similarly, if you connect a GPS receiver to your Palm OS device using a wireless Bluetooth connection, you should verify that the wireless connection is possible by installing and running the free Palm OS application called BtSerial (available at <http://www.palmgear.com/software/showsoftware.cfm?prodid=43757>). Once you are satisfied that the wireless connection is okay, run the SI application and select the site list's 'Select/GPSR Setup' menu item to setup SI's connection with your GPS receiver.

## Part 5. Example Uses

### 5.1 Identification

TODO (keyless)

### 5.2 Reference

TODO (every species has its own story)

### 5.3 Sighting Log

TODO (standardized listing)

### 5.4 Training

TODO (automation)

### 5.5 Research

TODO (mtDNA)

## Conclusion

Alderfer and Dunn describe the main differences between paperback field guides.

“Field guides are by definition portable and compact, so valuable information sometimes has to be edited or even omitted. Most field guide authors (and experienced birders)

agree on what information is most important, so there are many similarities among field guides. The main differences are in the quality and effectiveness of the visual presentation, the writing style and interests of the author, and the geographical scope of the guide.”

The universal field guide is fundamentally different.

- “the quality and effectiveness of the visual presentation” – The universal field guide avoids development costs by reusing the same generic user interface of lists to present topic text covering a variety of field guide topics. Its effectiveness comes not from the visual presentation, which is rather dull, but from its high level of integration.
- “the writing style and interests of the author” – The universal field guide topic text typically has multiple authors and therefore multiple styles. Because it is easy to add information to the universal field guide by creating a spreadsheet, copying it to the SD card, and linking it with the rest of the topic text, the interests of the user determine what information gets included.
- “the geographical scope of the guide” – Typically, the geographical scope of a paperback field guide is a portion of the country (e.g., birds of Western U.S.). In contrast, due to the storage capacity of today's flash memory, the geographical coverage of the universal field guide is an entire continent (e.g., birds of North America). Although it may initially seem counterintuitive, the universal field guide application offers greater geographical coverage at the same time as offering greater localization. With the geography list, users customize the universal field guide application to not only their region (e.g., Bird Conservation Region #29), but also to the current week of the year. And, because the universal field guide integrates with the species inventory application, you can organize the continental coverage according to the species sighted in your very own backyard.

Another difference is organization. Typically, paperback field guides are organized according to a small set of species attributes (e.g., the bird's position in the classification hierarchy, or the number of petals in a flower) that are used as keys to find groups of similar species. Instead of keys, the universal field guide implements **projections** that work on any available information. For example to identify a bird specimen, you check observations, such as sighting location and plumage color, and then project those observations onto the

<sup>2</sup> An example of an NMEA message is  
“\$GPRMC,172629.27,A,3723.8167,N,07912.0671,W,00.0,000.0,101106,09,W\*44”

classification list to see the list of candidate species. You can then project that list of candidate species onto the photo list to browse through their photos, ordered from most to least likely (according to eBird sighting statistics).

What information is available for projecting? A lot. For example, the birds of North America topic has over 320,000 links implemented, which demonstrates the main difference between paperback field guides and the universal field guide: integration.

## Appendix

### Appendix A. Installation and Setup

The no fuss approach to getting started using the ufg application is by purchasing the multimedia on a 1-GByte SD card. With that, simply insert the SD card to install the application and link the application with the topic multimedia and topic text. However, fuss can be good. One of the advantages of the universal field guide is that it puts you in control of your field guide content. For example, if there is an interesting field guide topic released, just unzip the topic to your SD card. You learn how to update your SD card by setting it up yourself in the following steps.

- 1) Remember the universal field guide users group at <http://groups.google.com/group/ufgu> is there to help.
- 2) Review the download and copy instructions at <http://www.eduneer.com/ufg>.
- 3) Install the universal field guide application to your Palm OS device by downloading and running the ufg-Installer.prc installer application. Note that if you have a previous version installed, you should uninstall it (using the Palm OS application launcher's 'App/Delete' menu item) before installing the new version.
- 4) (Optional) Install the species inventory (SI) application to your Palm OS device by downloading and running the si-Installer.prc installer application. Because SI integrates with the ufg application via a shared classification list, you'll need to first install the ufg application and run it at least once before you install and run SI.
- 5) Copy some topic text to your SD card by downloading the topic text and unzipping it to your SD card.
- 6) (Optional) Get some topic multimedia and copy it to your SD card.
- 7) Link the application, topic text, and topic multimedia together by selecting the universal field guide classification list's 'select/link' menu item.
- 8) Every distribution of ufg topic text and topic multimedia is in the form of a directory structure with /ufg at its root. Note that it is okay to copy one /ufg directory onto another because each topic text and topic multimedia has its own unique branch in the /ufg directory structure. Users typically do not need to know the /ufg directory structure. However, it is good to know when

troubleshooting ufg link problems (the ufg application will not be able to find and link the topic multimedia and topic text if they are not in their expected locations in the /ufg directory structure). Therefore, the /ufg directory structure is outlined here, where <topic> is the field guide topic name such as 'birds\_of\_North\_America' or 'ferns\_of\_North\_America'.

```
/ufg
  /ufg/admin
  /ufg/sighting
  /ufg/token
  /ufg/<topic>
    /ufg/<topic>/admin
    /ufg/<topic>/multimedia
      /ufg/<topic>/multimedia/audio
      /ufg/<topic>/multimedia/photo
      /ufg/<topic>/multimedia/video
    /ufg/<topic>/text
      /ufg/<topic>/text/attribute
      /ufg/<topic>/text/auxiliary
      /ufg/<topic>/text/classification
      /ufg/<topic>/text/custom
      /ufg/<topic>/text/etymology
      /ufg/<topic>/text/id
      /ufg/<topic>/text/lh
      /ufg/<topic>/text/manual
      /ufg/<topic>/text/mtDNA
      /ufg/<topic>/text/report
```

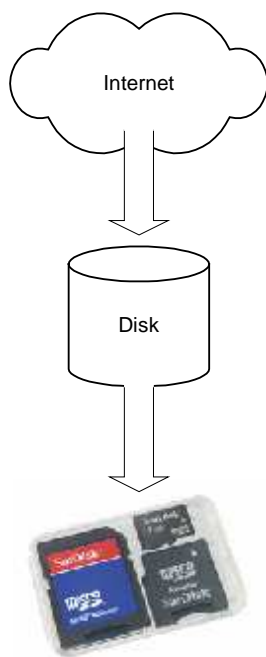
The update process is an advantage of the universal field guide (ufg) over paperback field guides and it becomes more important as the update rate increases. The American Ornithologists' Union updates their AOU checklist about every year. The universal field guide topic multimedia is expected to change about every year also. The universal field guide application is expected to change as improvements are implemented, perhaps every month. The universal field guide topic text is expected to change even more often, perhaps every week.

The ufg components (i.e., topic multimedia, topic text, and ufg application) are linked together by the user (by selecting the ufg application classification list's 'select/link' menu item). Therefore, to perform an update, the user needs to download only the changed component(s), which saves some time. To save even more time, the user can update only the changed portions of the changed component(s), which is called a differential update.

There are two parts to a ufg differential update.

- The differential download to your PC's hard disk is described in the download instructions (at [www.eduneer.com/ufg](http://www.eduneer.com/ufg)), and is performed by the FileZilla FTP client application.
- The differential copy to your SD card is performed by the ufgdu (universal field guide differential update) Windows OS console application, which is open source (GNU GPL).

Figure A-1 shows the typical path of ufg topic multimedia and topic text from the Internet to an SD card. Although it is possible to download directly from the Internet to your SD card, it is not recommended. The intermediate /ufg directory on your PC's hard disk drive acts as a backup of your SD card, and it also increases the efficiency of transferring data to your SD card (e.g., the FileZilla transfer block is smaller than your SD card block size and will result in unnecessary SD card writes).



**Figure A-1. UFG Typical Data Path**

According to the ufg file naming convention, when the content of a multimedia file changes, so does the file name. This enables the 'skip if file exists' feature of the FileZilla FTP client application to be used as differential update strategy when downloading multimedia from the Internet to your PC's hard disk: only the modified files get transferred.

A differential update strategy is also helpful when copying topic multimedia and topic text from your PC's hard disk to your SD card, not only to make the copying faster but to also to reduce the number of writes to your SD card (therefore increasing its life). The ufgdu (i.e., universal field guide differential update) application is a simple console Windows OS application (open source) that performs the differential updates between the /ufg directory on your PC's hard disk and the /ufg directory on your SD card.

Details about the ufgdu application are in the copy instructions available at [http://www.eduneer.com/ufg/copy\\_instructions.pdf](http://www.eduneer.com/ufg/copy_instructions.pdf).

## **Appendix B. Quick Find**

Scrolling to a particular species name is easy with the ufg application's Quick Find feature. Simply enter the text (using your device's graffiti area or on-screen keyboard or physical keyboard) and the list scrolls to it.

For example, to scroll the classification list to 'Summer Tanager' you could start entering the word 'summer'. In this case, data entry of four letters is sufficient.

### **Quick Find Guidelines**

- 1) The quick find text you enter is limited to lower case letters because upper case letters are reserved for viewing documentation (e.g., 'A' for audio, 'P' for photograph). However the quick find text you enter can match upper or lower case letters in the list. For example, you can scroll the audio list (in hierarchical classification order) to 'Greater White-fronted Goose' by entering the text 'goo'.
- 2) Your quick find text does not need to start at the beginning of a word.<sup>3</sup> For example, you can scroll the classification list to 'Canada Goose' by entering the text 'a g'.
- 3) You keep appending to the quick find text by entering more characters. The match will be underlined, always shown at the top of the list. Most other user interface tasks, such as switching to another list or scrolling a page or selecting a menu item, clear the quick find text.

<sup>3</sup> This is in contrast to the Palm OS global find utility that does require search text to start at the beginning of a word.

- 4) The ufg application beeps if you enter quick find text that cannot be found in the list. Typically, a user's response to this beep is to enter a backspace<sup>4</sup> to remove the last character. If you prefer to reset your quick find text in its entirety rather than backspacing one character at a time, enter the return character, which **returns** the list to its beginning. As a reminder to graffiti users, the return character is a diagonal line from upper right to lower left. And as a reminder to keypad users, some devices map the return key to the center button of the 5-way navigator. With a device that maps the return key, the most intuitive way to start a new quick find search is to enter the number '1' and the ufg application will scroll back to the 1<sup>st</sup> item in the list.
- 5) Some species have multiple common names and quick find searches all of them. Therefore, quick find might scroll to a common name that is not presently displayed. For example, the default common name for *Pipilo erythrophthalmus* is Eastern Towhee. However, you can scroll to it by entering the quick find text 'ruf' because its other common name is **Rufous**-sided Towhee.
- 6) The period '.' is a quick find shortcut. If you have already entered quick find text, entering a period causes quick find to scroll to the next occurrence of that text. If you have not entered quick find text, entering a period causes quick find to scroll to the highlighted item in the list. For example, in the classification list you can enter 'fli' to scroll to 'Northern **Flicker**' and then enter '.' to scroll to 'Gilded **Flicker**' and another '.' to scroll to 'Fernandina's **Flicker**'.
- 7) The @ sign is another quick find shortcut, restoring your previously entered quick find text. This can be helpful when switching back and forth between different ufg application forms, which clears your quick find text.
- 8) In addition to entering text, you can also enter item numbers. When you enter a number, quick find scrolls to that item in the

list. For example if you are viewing a page near the end of a lengthy list and you want to scroll back to the list's beginning, just enter '1'.

- 9) Quick find scrolling, as with scrolling one item at a time or scrolling one page at a time, does not change which species is highlighted. However if you want to highlight the species containing quick find text in order to see what documents are associated with it (e.g., 'I' for identification tips, 'P' for photograph), enter a comma.
- 10) Use the 'check/quick find text' menu item to check all the items in the list containing the quick find text currently entered.

### Quick Find Exercise

In this exercise, you will use quick find to check all the species names in the classification list that contain the text 'warbler'.

- 1) Switch to the classification list.
- 2) Clear the checks by selecting the 'check/clear all' menu item.
- 3) Enter the quick find text 'warbler'. (The list will scroll to 'Japanese Bush-warbler'.)
- 4) Select the 'check/quick find text' menu item.

The result is 78 checked items.

### Appendix C. Check Please

Each list in the ufg application has a column of checks. If you want to get the most out of the ufg application, you should learn how to use the checks. They can be used in several different contexts.

#### automation

The photo and audio lists can automate the presentation of multimedia. The photo list can present slide shows that flip through the checked photographs every few seconds, and the audio list can loop through a play list of the checked recordings. To start the automated presentation, tap the play icon at the bottom of the photo or audio list. The neighboring repeat icon causes the automated presentation to repeat.

<sup>4</sup> In Graffiti 2, a backspace is a horizontal line drawn from right to left.

## document search

The icons at the bottom of the classification list denote that the highlighted species is associated with some documentation (e.g., 'E' for etymology). To see which species has a certain type of documentation, it would be possible to manually scroll through and highlight each species in the list while looking for the icon associated with that document to appear. However, a more efficient approach is to have the ufg application check the species that have the documentation of interest. For example, to determine which of the species have identification tips available,

- switch to the classification list,
- clear the checks by selecting the 'check/clear all' menu item,
- select the 'check/projection logic' menu item,
- in the check logic options dialog, select 'included/identification tip', check 'or', and tap the 'OK' button.

The result is 696 checked species.

## favorites

The checks are used in so many different contexts that they are often overwritten. The check favorites are persistent checks (in an SD card file in the /ufg/<topic>/text/favorite directory) that users can save and restore. For example, suppose that you want to keep track of the vocalizations that sound stranger-than-fiction in order to play them some day for the amusement of others. The Three-wattled Bellbird might be a good start.

- Switch to the audio list.
- Clear the checks by selecting the 'check/clear all' menu item.
- Scroll to the Three-wattled Bellbird by entering the text 'd bel' (i.e., starting at the last letter of the first word).
- Check both recordings of the Three-wattled Bellbird.
- Save them as favorites by selecting the 'check/save as favorites' menu item.
- Optionally, to test that they were saved, clear the checks by selecting the 'check/clear all' menu item. Restore the favorites by selecting the 'check/projection logic' menu item. In the 'check logic options', select

'source list/favorite', check 'or', and tap the 'OK' button.

## reports

Reports are a way to transfer the results displayed by the ufg application to other applications such as a spreadsheet or an email application. To create a tab delimited text file of the checked items in a list, select the 'select/create list report' menu item.

The ufg application generates the report in the SD card's /ufg/<topic>/text/report directory.

## scroll

Often checks are sparsely distributed throughout a list. Although scrolling a page at a time while looking for checks is a possible approach to scrolling to the previous/next check in the list, the ufg application offers a more efficient approach: check-to-check scrolling. To use the ufg application's check-to-check scrolling

- highlight an item in the list (checked or not),
- press the left/right side of the 5-way navigation button to scroll to and highlight the previous/next checked item in the list.<sup>5</sup>

## Appendix D. Link Token File

A link token is a way for universal field guide users to get access to the free topic text in exchange for submitting a link token file, which is an overview of what universal field guide application features are getting used. For example, the report counts how often the photo viewer executes but it does not track what species the photo viewer displays. It tracks how often the SI application executes but it doesn't track what species are logged. In essence, the link token files give an overview of how users are spending their time in the ufg application and therefore which ufg features are most deserving of maintenance and updates. Links are designed to last forever and link tokens are designed to last 30 days. In other words, once you have a link token the 'select/link' menu item should result in a full link (not a partial link of topic text) for 30 days, and once the topic text and topic multimedia are linked they should stay linked until your text 'select/link' menu item selection.

---

<sup>5</sup> Alternatives to pressing the left and right edges of the 5-way navigation button are selecting the 'view/previous check' and 'view/next check' menu items.

universal field guide.

- checksum – The checksum field helps ensure that the measurements are from the universal field guide application and not edited by the user.

The link token file contains measurements of how you have been using the universal field guide application. The measurements give a general overview of the preferences of universal field guide users. For example, there are no measurements of what species information you are accessing but there are measurements of the number of times you open the photo viewer, open the Wikipedia text viewer, or play recordings. The main purpose of measuring user preferences is to help focus development on the areas used most. The resulting user preferences report can also be used by users to learn about overlooked features that are commonly used by others. For example, you may be more inclined to try the audio search capability if you see that a lot of other people are using it.

The link token file is tab-delimited text that you can read with any text editor. The measurements are described below.

- counts – Measurement names that start with an ‘n’ are counts of how many times you’ve employed a feature. For example, ‘nClassL’ is the number of times you switched to the classification list and ‘nPhoto’ is the number of times you switched to the photo viewer.

A more complex counter is ‘nCheckOp’ that counts the number of times you’ve projected lists from one list to another. The class, photo, audio, video, attribute, custom, and geography lists are assigned numbers 0 through 6 respectively, and the from and to list numbers are appended to the ‘nCheckOp’ name. For example, ‘nCheckOp50’ is the count of the number of times you projected checks from the attribute list to the classification list.

- timers – Measurement names that start with a ‘t’ are timers of how long you’ve employed a feature. For example, ‘tClassL’ is the number of ticks (i.e., 1/60 second) that you’ve spent switched to the classification list and ‘tPhoto’ is the number of ticks that you’ve spent switched to the photo viewer.
- SDID – The inclusion of the SD card’s ID enables the study of if/how preferences change over time. For example, more experienced users may gravitate to a different set of features than those used by users who have just started using the

## **Appendix E. Tips and Tricks**

- The automatically generated link report, at /ufg/<topic>/admin/link.txt, is a good way to diagnose setup problems, such as an incorrectly copied topic text directory.
- To quickly switch from the ufg application to the species inventory application, enter ‘S’. Conversely, to quickly switch from the species inventory application to the ufg application, enter ‘U’.

## **Appendix F. Change Log**

2009 June 12

- In ‘Navigation’ section, added a comment about the requirement for a species to be highlighted in order for the scroll highlight to next checked species feature to work.
- In ‘Part 3. Extra Features’ section, added a section on collaboration.

2009 June 09

- In ‘Navigation’ section, added tips on how to switch between field guide topics.

2009 May 24

- Added change log.
- Updated ‘Overview – What’s the Difference’ section.
- Replaced ‘check/projection’ with ‘check/project’.
- Replaced ‘check/logic’ with ‘check/projection logic’.
- Removed ‘User Collaboration’ section.
- Added tips about playing recordings to ‘Navigation’ section.