

Decision support tools

Invasive species identification kits

Background and guidance in the use of these tools for identifying potentially invasive non-native species of marine and freshwater fauna: fish, invertebrates and amphibians



Adaptations of the Pheloung, Williams & Halloy (1999) Weed Risk Assessment tool kit.

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These tool kits were developed by Cefas, with VBA for Excel and computational programming by Lorenzo Vilizzi, David Cooper, Andy South and Gordon H. Copp, based on VisualBasic code in the original Weed Risk Assessment (WRA) tool kit of P.C. Pheloung, P.A. Williams & S.R. Halloy (1999).
<http://www.daff.gov.au/ba/reviews/weeds/system>

We are grateful to Pheloung et al. (1999) for providing an open version of the original WRA as well as for their permission to adapt the original code for the tool kits made available here:

- [FISK - Freshwater Fish Invasiveness Screening Kit \(v2.03 Calibrated\) \[Excel, 626 kb\]](#)
- [S-FISK - Spanish language version of FISK \(v1.19 Calibrated\) \[Excel, 1.71 Mb\]](#)
- [MFISK - Marine Fish Invasiveness Screening Kit \(v1.19\) \[Excel, 1.64 Mb\]](#)
- [MI-ISK - Marine Invertebrate Invasiveness Screening Kit \(v1.19\) \[Excel, 1.71 Mb\]](#)

- [FI-ISK - Freshwater Invertebrate Invasiveness Screening Kit \(v1.19 Calibrated\) \[Excel, 1.66 Mb\]](#)
- [AmphISK - Amphibian Invasiveness Screening Kit \(v1.19\) \[Excel, 1.65 Mb\]](#)

Historical background

FISK was originally adapted from the WRA during the development of a two-part risk analysis scheme for non-native freshwater fishes in the UK (see Copp et al. 2005a,b). Funded by Defra contract no. SF0238, this scheme consisted of a risk identification protocol (FISK, adapted from the WRA) and a risk assessment protocol adapted from European Plant Protection Organisation standards PK5/1-4 (EPP0 2000). Subsequently, FISK has been used as an invasive species identification tool to complement the GB non-native risk assessment scheme ([Baker et al. 2008](#)) and the European Non-native Species in Aquaculture Risk Analysis Scheme (ENSARS), which was developed in response to European 'Council Regulation No. 708/2007 of 11 June 2007 concerning use of alien and locally-absent species in aquaculture' (Copp et al. 2008).

As part of a contract to develop the GB scheme, FISK v1 was adapted for marine fish, marine invertebrates and amphibians. These initial versions were all still nested within the original WRA package. The original WRA code was re-drafted to create the current versions of FISK and its 'sister' tool kits as contributions to a variety of research contracts:

- UK Defra contract SF0248 on non-native fish species (Contract Leader: Prof. Gordon H. Copp, Cefas)
- EC project 'IMPASSE' on the use of alien species in Aquaculture (Contract Leader: Prof. Ian G. Cowx, HIFI, Hull), <http://www.hull.ac.uk/hifi/IMPASSE/>
- Scottish Executive contract to finalize the GB Non-native Species Risk Assessment Scheme (Contract Leader: Prof. John Mumford, Imperial College, London).

In 2010, new funding from the USDA to Dr Jeff Hill (University of Florida) and Dr Scott Hardin (Florida Fish and Wildlife Conservation Commission), complemented by an existing research contract to G.H. Copp from UK Defra, led to the revision of FISK to make it applicable to a wider range of climate zones, specifically those (warm temperate, semi-tropical) associated with peninsular Florida (USA). This revision included extensive improvement of the user interface by Dr Lorenzo Vilizzi (Latrobe University), resulting in FISK v2 (Lawson et al. 2013).

Toolkit overview

The questions in these tool kits were adapted from the Pheloung et al. (1999) original by Cefas with contributions from the persons indicated below:

FISK v1: Gordon H. Copp (Cefas), Rachel Garthwaite (formerly Cefas, now the Royal Society, London) & Rodolphe E. Gozlan (University of Bournemouth, England).

FISK v2: Gordon H. Copp (Cefas), Jeff Hill and Larry Lawson (University of Florida), Scott Hardin (Florida Fish and Wildlife Conservation Commission) & Lorenzo Vilizzi (La Trobe University).

S-FISK: As above for FISK v1, with the translation of FISK text elements into Spanish language by Roberto Mendoza (Universidad Autónoma de Nuevo Leon, Mexico).

MFISK: Jim Ellis (Cefas) & Gordon H. Copp (Cefas).

MI-ISK: Jim Ellis (Cefas), Anna Occhipinti (UNIPV, Pavia, Italy), Dario Savini (UNIPV, Pavia, Italy) & Gordon H. Copp (Cefas).

FI-ISK: Elena Tricarico (UNIFI, Florence, Italy), Francesca Gherardi (UNIFI, Florence, Italy) & Gordon H. Copp (Cefas).

AmphISK: Matthew Ellis (CCW, Mold, Wales), Liz Howe (CCW, Bangor, Wales) & Gordon H. Copp (Cefas).

The finalisation of these tool kits benefited from comments and suggestions received from a number of individuals besides those mentioned above, including: Becky Cudmore (DFO, Canada), Gemma Fenwick (formerly of Cefas), Michael J. Godard (Cefas), Stephan Gollasch (GoConsult, Germany), Vladimír Kováč (Comenius University, Slovakia), Nick Mandrak (DFO, Canada) and Hugo Verreycken (INBO, Belgium). Apologies to anyone whose name has been overlooked.

The front menu of v1 tools was designed by Irene Gooch (formerly of Cefas) using photos kindly provided by:

- Background: Gordon H. Copp

- Photos (from left to right):

- Upper row: The Herpetological Conservation Trust (HCT, UK), Rodolphe E. Gozlan (University of Bournemouth, UK), The HCT (UK), Gordon H. Copp (Cefas);

- 2nd row: Gordon H. Copp (Cefas), Riccardo Innocenti (UNIFI, Florence, Italy), Gordon H. Copp (Cefas);

- 3rd row: Jim Ellis (Cefas), Luis Zamora (University of Girona, Spain); 4th row: Riccardo Innocenti (UNIFI, Florence, Italy).

The front menu of FISK v2 was designed by Elizabeth A. Copp (graphic designer) using photos kindly provided by:

- Background: Gordon H. Copp

- Photos from left to right: Larry Lawson (University of Florida), Luis Zamora (University of Girona), Larry Lawson (University of Florida) and Eva Záhorská (Comenius University)

Toolkit description (FISK v2)

The tool kits are designed to be as self-explanatory as possible. The main menu has four main options:

Toolbox use:

- Run Assessment - Clicking this button starts the risk identification assessment and brings up the Species Assessment Menu:
 - The assessor is offered the opportunity to create a New record (i.e. start a New species), Edit or Delete an existing record. In the Setup New Species Record dialog, the assessor must give the Species name (i.e. Latin name), Common name (or 'n/a' when a common name does not exist), and his/her (Assessor) name. If either field is left blank upon committing the changes, the user is notified accordingly.
 - The total number of species in the list is displayed along with the total number of selected species. Holding Ctrl whilst clicking the left mouse button will individually select multiple species in the list; holding Shift whilst clicking the left mouse button will select multiple adjacent species in the list; checking or unchecking boxes will select or unselect individual species in the list.
 - Species in the list can be sorted by ascending order by clicking on the combobox based on any of the column headings in the list (except for the unique ID).
 - User-defined thresholds can be set by pressing the UD Thresholds button. This brings up a dialog where new Medium and High thresholds can be defined or previous UD thresholds can be cleared.
 - The score of each species in the list can be re-calculated (i.e. refreshed) by pressing the Re-score button (this is a feature mainly of use to the program administrators when collating and combining multiple scores across studies).
 - A report can be generated for one or more selected species in the list by clicking on the Report button.
 - The Open Q & A button brings up the species assessment dialog (also opened by double-clicking on a species in the list). For each of the 49 questions, the assessor is asked to provide the Response, level of Certainty, and a Justification. For each question, a detailed explanation (Question Help) is provided and Advice for the Certainty level can be accessed by clicking on the corresponding button. To facilitate navigation, the Go to Question combobox lets the user jump to any question in the list, which can be otherwise navigated through by pressing the basic navigation buttons. Responses for any question can be cleared by pressing the Clear button. The total number of completed questions is also indicated. Editable fields for completed questions are displayed in light green, for unanswered questions in light red, and for questions being edited in light yellow. Finally, the user can choose either to quit the species assessment dialog without saving any of the changes made since opening (Close no Save) or to commit the changes made (Save and Close).

- Define RA Area - Clicking this button allows the user to specify the name of the Risk Assessment (RA) area for which species assessments are being made.

Advanced Functions:

- Unprotect - This button (password protected) is for accessing the internal workings (programming) of the tool kit.
- Export Data - Clicking this button will output the database of species assessments as an Excel file.

Toolkit Help:

Clicking any of the buttons (Overview, Scoring, Exporting Data, Credits) will provide the relevant information. The secondary menu allows the user to move between these four help screens.

Exit Excel:

- Save and Close - Click this button will save all changes made and close Excel.
- Close No Save - Click this button will close Excel without saving changes.

Undertaking a risk identification assessment (all toolkits)

The risk identification tool kits consist of six worksheets, which are linked through VBA for Excel programming. Access to these worksheets is password protected. The general user is able to sort and output the database of assessments they create.

Clicking the Run Assessment button allows the user to select an existing species or to create a new entry.

The user is presented sequentially with 49 questions in sequential 'question menus'. In each of the 49 question menus, the assessor must:

- 1) Answer the question (yes, no, don't know),
- 2) Provide a confidence level for that response (very uncertain, mostly uncertain, mostly certain, very certain)
- 3) Provide a justification for that response (i.e. bibliographic source, background information, etc.).

Constraints when moving forward or backward through the question menus:

With any given question menu, a consistent response is required for the assessor to proceed to the next question menu. In other words, all three queries (question,

certainty, justification) must be answered (or all three left unanswered) for the assessor to proceed to the next (or back to the previous, or any other) question menu.

A question is counted as unanswered if any of these items is not completed.

The responses and scores are stored to the workbook 'database' as the assessor moves through the question menus. From the responses, a numerical score is calculated using the following threshold levels:

For FISK v1, which has been calibrated (see Copp et al. 2009): Low (scores < 0 = low risk), Medium (1-18 = medium risk), or High (≥ 19 = high risk).

For FISK v2, the v1 calibration remains valid (see FISK v1) for the UK, with calibrations for other countries summarized in Copp (2013). In FISK v2, thresholds can be defined by the user.

For FI-ISK, which has been calibrated (Tricarico et al. 2009): accept (scores < 0 = low risk), evaluate (1-15 = medium risk), or reject (≥ 16 = high risk).

For MFISK, MI-ISK and AmphISK, which have not yet been calibrated, the original score thresholds of Pheloung et al. (1999) are used pending calibration: accept (scores < 0 = low risk), evaluate (1-6 = medium risk), or reject (> 6 = high risk).

These thresholds can be modified by Cefas once calibration and validation has been undertaken and the relevant documentation is provided.

The certainty response is only stored if both the question response and justification are completed. A question is counted as unanswered if any of these items is not completed - in such a case, a default (precautionary) score is given (i.e. the highest possible value).

The tool kit compiles all of the responses for a species in one data line (row) and these 'assessment reports', i.e. the database of assessments, can be organised alphabetically by Genus/species name ('Sort Species List' button). The database can be exported ('Export' button) as a new Excel workbook. The new workbook is only retained if the user selects 'Save and Close', and the user will be prompted to provide the workbook with a file name.

Existing entries may be exported or amended by using the navigation controls.

Note that changes to the database (i.e. new entries, changes to existing entries) are not saved until the assessor leaves the Excel using the 'Save and Close' button.

Scoring

The responses are translated into a numerical score, with positive values (1 or 2) allocated to reflect an elevated risk, a zero given to reflect intermediate risk, and a negative value (-1) given to reflect low or negligible risk. The scoring table is defined in the yellow columns under the heading 'Response' and the values are the same as those given in Pheloung et al. (1999), with deviations thereof described in [Copp et al. \(2005a\)](#).

The 'climate' and 'invasive elsewhere' sections generate a score using a weighting system: a better climate match decreases the climate weight (because of the increased certainty of a reliable climate matching assessment) and a poorer quality of match increases the weight (because of the greater uncertainty associated with the climate matching assessment, and thus the increase in potential risk).

The species elsewhere responses, as defined in the Response column, are multiplied by the climate weight to generate the final score for each question.

The total score is compared to the critical values in the threshold levels to determine the outcome. These values can be modified by the toolkit authors upon request.

In addition to the score, the number of questions answered in each section is tallied. More information is required if the minimum criteria in the 'Questions answered' table are not met: The minimum numbers of questions required per section are (as per Pheloung et al. 1999):

Biogeography = 2, Undesirable attributes = 2, Biology/Ecology = 6

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