



**DEPARTMENT OF THE ARMY**  
MISSISSIPPI VALLEY DIVISION, CORPS OF ENGINEERS  
P.O. BOX 80  
VICKSBURG, MISSISSIPPI 39181-0080

REPLY TO  
ATTENTION OF:

CEMVD-PD-N

15 November 2012

MEMORANDUM FOR CECW-MVD (Redican)

SUBJECT: Recommendation of Certification of the Bluegill Winter Habitat Suitability Index Model in the Upper Mississippi River

1. References:

- a. Engineering Circular 1105-2-412: Assuring Quality of Planning Models, dated 31 March 2011.
  - b. Model Approval Plan, Bluegill Winter Habitat Suitability Index Model, Upper Mississippi River (Encl 1).
  - c. Bluegill Winter Habitat Suitability Index Model Documentation (Encl 2).
  - d. Bluegill Winter Habitat Suitability Index Model Calculator (Encl 3).
2. The National Ecosystem Planning Center of Expertise (ECO-PCX) recommends certification of the Bluegill Winter Habitat Suitability Index (HSI) Model for use in the Upper Mississippi River. Please log in this recommendation with the Office of Water Project Review for consideration by the Model Certification Team.
3. The first edition bluegill HSI model (Stuber et al. 1982; Encl 2, Attachment 4-4) was developed by the U.S. Fish and Wildlife Service (USFWS) and did not consider winter habitat conditions. The Upper Mississippi River System (UMRS) often experiences prolonged ice cover and winter conditions take on great importance in the evaluation of the quality of aquatic habitat for bluegills and other fish species. The absence of winter habitat variables in the model limits its usefulness as a planning and evaluation tool. Therefore, the St. Paul District (MVP) modified the model to include variables which address these conditions.

MVP and State and Federal fishery biologists who manage the resource identified dissolved oxygen, water depth, current velocity, and water temperature as the most important variables affecting habitat quality in the winter. Using monitoring data and professional judgment, the assessment team developed draft suitability index curves (scale of 0 to 1) for each variable and modified life requisite component formulas for cover, water quality, and other to incorporate the winter habitat variables.

The documentation was sent to eight fisheries biologists involved in the management of fishery resources on the UMRS for peer-review. This group included representatives from the USFWS, Iowa Department of Natural Resources (DNR), Minnesota DNR, and Wisconsin DNR. MVP modified the suitability index curves and model documentation based on the comments received from the reviewers, and incorporated them into the final model documentation report (Palesh and Anderson 1990; Encl 2, Attachment 4-1).

SUBJECT: Recommendation of Approval for Use of the Bluegill Winter Habitat Suitability Index Model in the Upper Mississippi River

4. The ECO-PCX reviewed the model in accordance with reference 1.a and the model approval plan (Encl 1). Abt Associates Inc. managed the external review of the Bluegill Winter Habitat Suitability Index Model. The review was conducted to assess the technical quality, system quality, and usability of the model and prepared a model review report (Encl 2, Attachment 4-5). The review team included a Ph.D-level spreadsheet auditor and M.S-level experts in plan formulation and fish ecology.

There were 7 final panel comments (4 of high significance and 3 of medium significance). Comment responses are found in Encl 2, Attachment 4-6. All critical comments were addressed to the satisfaction of the ECO-PCX. Four of the comments were immediately resolved to include a refinement of variable definitions, an updated suitability index curve for winter water depth, spreadsheet errors (i.e., winter water temperature formula and water quality component aggregation formula), and guidance on generation of AAHUs over the life of the project. The remaining 3 comments recommended testing, validation, and calibration of model variables, suitability curves, and assumptions. The District concurred and noted over time the model will be tested and refined based on monitoring of USACE ecosystem restoration projects, state collected fisheries data, and data collected under the UMRS Long Term Resource Monitoring Program. The next update to the model will address these recommendations and further clarify model assumptions and limitations.

5. The Bluegill Winter HSI meets USACE technical quality standards. The basis for the model is rooted in the ecological niche theory (i.e., Hutchinsonian niche). This concept views the niche as the environmental conditions and resources which define the requirements of a species to survive and reproduce. The model addresses the year-round habitat (niche) requirements (variables) which affect the distribution and abundance of bluegill in the UMRS. Model assumptions are stated and supported in the model documentation, although further refinements will occur with additional data collection and analysis. The model is in compliance with Corps policies and accepted procedures.
6. The model meets USACE system quality standards. The software platform (MS Excel 2007) is appropriate and available to all users. A full inspection of the model formulas and output calculations was performed during the review. Minor errors were found by the reviewers, resolved by the model proponents, and inspected by the ECO-PCX. The spreadsheet incorporates best management practices including cell locking, highlighting input, output, and calculation cells, and data validation. The spreadsheet will be maintained by the ECO-PCX.
7. The model has acceptable usability in that data input, scoring of variables, development of an overall HSI score, and output interpretation is straightforward. The data required for input is readily available through a combination of information ascertained through field/site visits and/or elicitation of expert assistance from ecologists and biologists. The model is transparent and would allow for verification of calculations and outputs. User guidance is provided in the spreadsheet and within the model documentation (Encl 2). This guidance could be improved through more elicited definitions of variables and data collection techniques, which could be included in future updates.

CEMVD-PD-N

SUBJECT: Recommendation of Approval for Use of the Bluegill Winter Habitat Suitability Index Model in the Upper Mississippi River

8. In summary, the ECO-PCX recommends certification of the Bluegill Winter Habitat Suitability Index Model for use in the Upper Mississippi River System. The model is based on established theory, computationally correct, in compliance with USACE policy, has acceptable system quality, and meets usability criteria. Please notify the ECO-PCX of the findings of the Model Certification Panel.

3 Encls



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Enclosures at <ftp://ftp.usace.army.mil/usace/mvd/ECO-PCX/Model%20Certification/MVP%20-%20BluegillWinterHabitatHSI/>

CF (w/out enclosures):

CECW-PC (Coleman, Matusiak, Trulick)  
CECW-CP (Kitch, Hughes)  
CECW-PB (Carlson)  
CECW-MVD (Brown, Redican)  
CEMVD-PD-N (Wilbanks, Smith, Creswell)  
CEMVP-PD (Birkenstock)  
CEMVP-PD-P (Barr, Devendorf)  
CEMVP-PD-C (Johnson, Clark, McFarlane)  
CEMVP-PD-F (Knollenberg)  
CEMVR-PM-M (Hubbell)  
CEMVR-PD-P (Theiling, Richards)