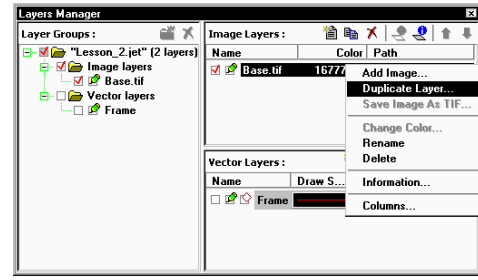
Lesson 2. Vectorizing of swamp polygons

We shall need two images for swamp vectorizing. The first is a «lite» copy of the source raster – so called «cover», which will be used for quality control at vectorizing. The source image itself may be too big for quickview; besides, it should remain intact (we shall extract all subject layers from its copies).

The second image contains only strokes that represent swamps in the map. It is also a copy of the source image but one that underwent special processing.

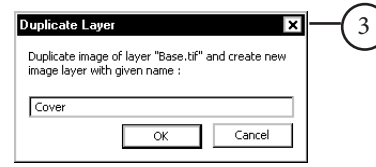
Step 1. Preparing of a set of images

1. Click Ctrl+L to open *Layer Manager.*

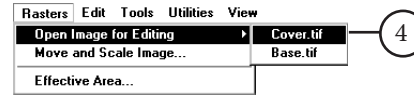


2. Copy the source image Base.tif to create a «cover». To do it, move the cursor to the name Base.tif, then right click, and select *Duplicate Layer* command.

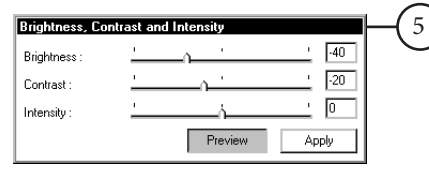
3. Type *Cover* and click *OK.*



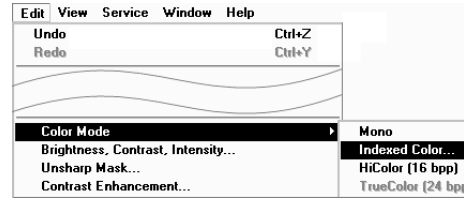
4. Select *Open Image for Editing* command in *Rasters* menu. Click *Cover.tif.*



5. Select *Brightness, Contrast, and Intensity* tool  . Decrease brightness and contrast and click *Apply.*

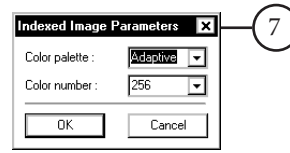


6. Convert the image into a 256-color one. To do it, select *Color Mode-> Indexed Color* in *Edit* menu.



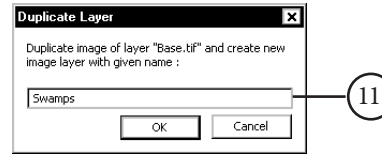
7. Specify parameters of the index image:
   Color palette - *Adaptive*
   Color number - 256.

8. Click *OK*.



9. Close the raster. The «cover» is ready. It is easier to control quality of line tracing against this background.

10. Copy the source image *Base.tif* once again to extract swamp strokes.
    Click Ctrl+L to open *Layer Manager*.
    Move the cursor to the name *Base.tif*, then right click, and select *Duplicate Layer* command.



11. Type Swamps and click *OK*.

12. Close the *Layer Manager* dialog box.

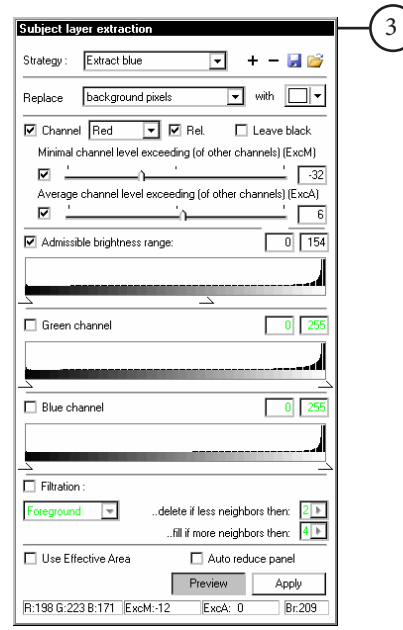
Step 2. Extraction of swamp strokes from the image

Now, we shall extract a black-and-white image of swamp strokes from Swamps.tif.

1. Select *Open Image for Editing* command in *Rasters* menu. Click *Swamps.tif.*

2. We want to extract objects that had to be blue (actually, they may be dark green, purple, or violet in the image).

3. Select *Subject Layer Extraction*  . Specify operation parameters as it is shown in the figure.



   Create a new strategy  to save these settings of the tool, call it *Extract blue,* and click  .

   Strategy is just a convenient way to keep and use a set of utility parameters.

4. Click *Apply.*

5. To remove the background completely, select *Subject Layer Extraction* and specify operation parameters as it is shown in the figure.

   Create a new strategy to save these settings of the tool, call it *Suppress grey, and click* .

6. Click *Apply*.

7. To restore the form of strokes affected by color filtering, select *Diffuse Tool* .

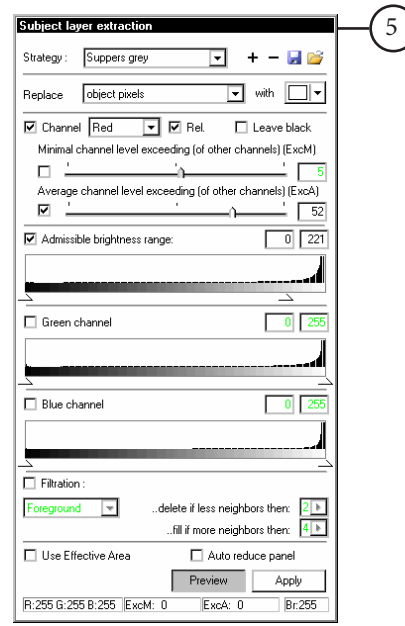
   Specify operation parameters:
   Factor = 1.00
   Radius = 2 px.

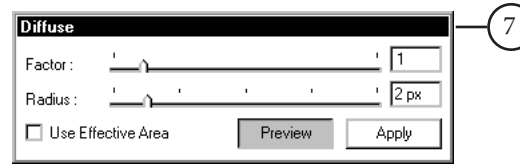
8. Click *Apply*.

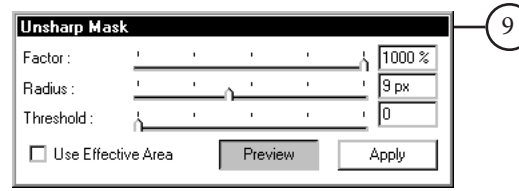
9. *Unsharp Mask* now to increase contrast of lines.

   Specify operation parameters:
   Factor = 1000
   Radius = 9 px
   Threshold = 0.

10. Click *Apply*.







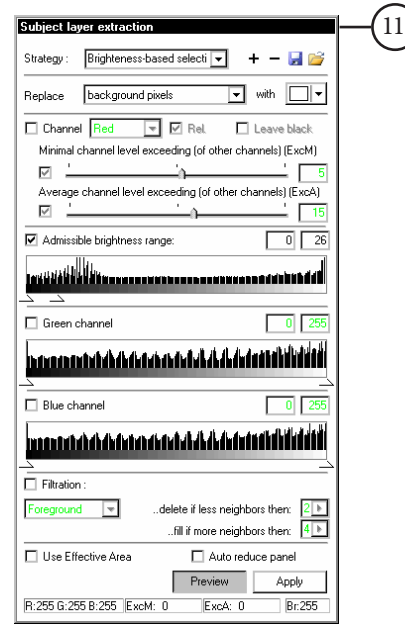
11. Now, we shall clean the image from bright tints of the background. Select *Subject Layer Extraction* and specify operation parameters as it is shown in the figure.

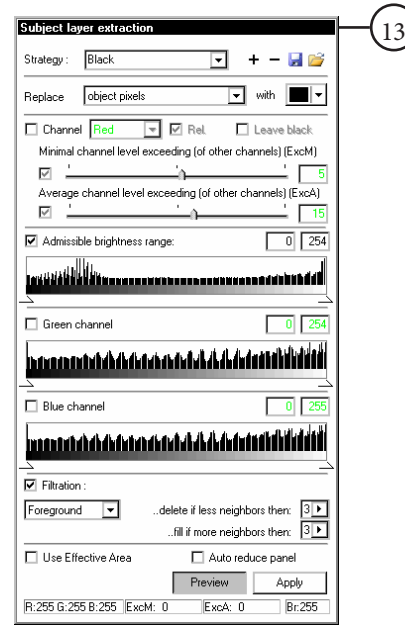
    Create a new strategy to save these settings of the tool, call it *Brightness-based filtering,* and click .

12. Click *Apply*.

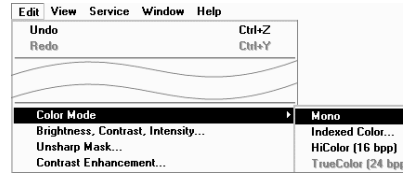
13. Substitute all colors but white (brightness 255) for black.
    To do it, select *Subject Layer Extraction* and specify operation parameters as it is shown in the figure.
    Create a new strategy to save these settings of the tool, call it *Black* and click .

14. Click *Apply*.





15. Image transformation into a black-and-white one.
Select *Color Mode -> Mono* in *Edit* menu.



16. Invert the image with *Inversion Tool*  .

17. Cleaning of the image now - the *Large garbage removal* strategy of *Mask Filtering Tool*  .

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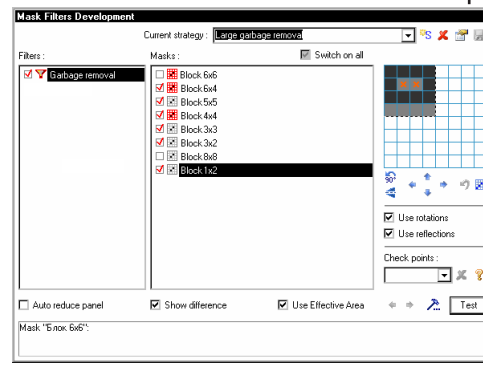

18. Click *Test.* The current filtering strategy is applied.

19. *Mask Filtering*  again - the *Swamp line extraction* filter separates strokes from other lines. *Click Test.*

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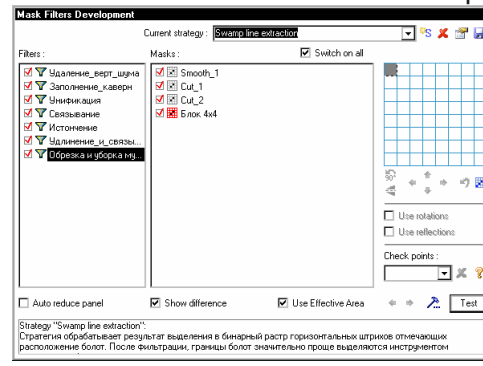
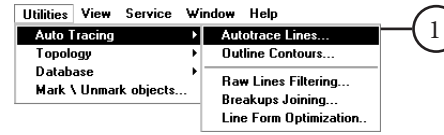


20. *Ctrl+S* to save the image.

21. Close the raster editing window.

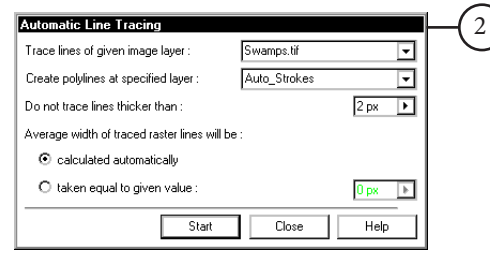
Step 3. Vectorizing of strokes and automatic forming of swamp polygons

1. Automatic vectorizing of the Swamps.tif image.
   Select *Auto Tracing -> Autotrace Lines* in *Utilities* menu.



2. Select the Swamps.tif raster layer for tracing.

3. Specify the *Auto_strokes* name for the new vector layer where to automatically vectorized lines will be attributed.



4. Specify *Do not trace lines thicker than* parameter equal to 2 px to discard most of river line fragments remaining after mask filtering.

5. The program calculates the average width of raster lines automatically by default.

6. Click *Start*

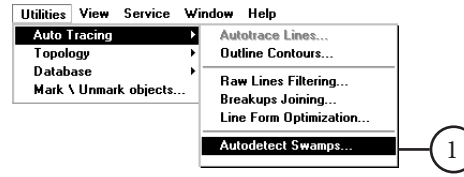
7. Close the *Automatic Line Tracing* dialog box.

Automatic vectorizing of the Swamps.tif image provided a lot of vector lines but only some of them correspond to swamp strokes. We shall use the 256-color image Cover to recognize them.

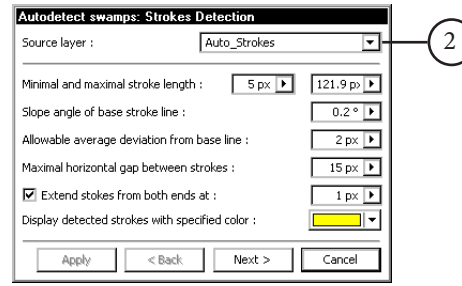
1. Select *Auto Tracing -> Autodetect Swamps* in *Utilities* menu.

2. Select *Auto_Strokes* as the source layer containing vectorized swamp strokes.

3. Switch on the option *Extend strokes at both ends at 1 px* to compensate stroke shortening at extraction and automatic vectorizing.



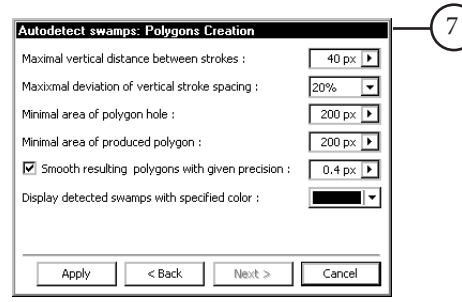
4. There may be gaps in strokes at crossings with lines of other layers; on the other hand, «islands» may occur inside swamp polygons. Specify *maximal horizontal gap between strokes* equal to 15 px.



5. You may specify individual strokes on the screen or cross a group of them (representing one swamp) for parameter adjustment. It may be also done manually.

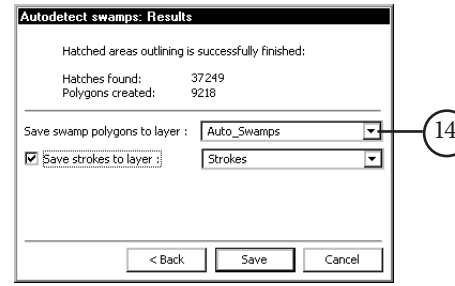
This method is applicable for adjustment of the following parameters: minimal and maximal length of strokes, slope of the stroke baseline, allowable average deviation from the baseline.
Click Apply.
Strokes corresponding to the specified parameters will be found and marked with color.
If the result of stroke detection suits you, click Next to proceed to the next step.
Otherwise edit parameter values and click Apply once again.

6. Next step is polygon forming on the base of detected strokes.



7. Specify operation parameters as it is shown in the figure:
Maximal vertical distance between strokes - 40 px.
Maximal deviation of vertical stroke spacing - 20%.
Minimal area of polygon hole - 200 px.
Minimal area of produced polygon - 200 px.

Switch on the *Smooth resulting polygons* option and specify precision *0,4 px*.



8. Click *Apply*. All possible swamp contours will appear on the screen.

9. Click *Next*.

10. Input the *Auto_Swamps* name for the new layer that will contain swamp polygons.

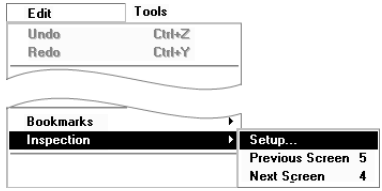
11. Switch on the *Save strokes to layer* option and input layer name *Strokes*.

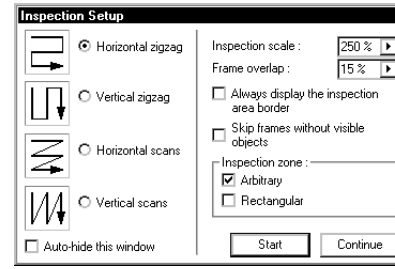
12. Save results of utility execution.

Step 4. Shape improvement

This step comprises regular review and correction of polygons generated by Autodetect Swamp utility.

Select Inspector tool in Project menu and apply it for regular review of the project field (Inspection scale 250%, Frame overlap 15%). Hot keys 4/5 move the working window to the next/previous frame. Proceed to the next frame when defects of objects in the current one are removed.



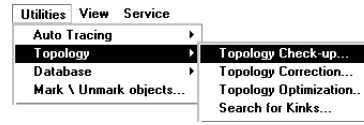


Eraser tool  *(hot key Q) helps to delete vector «rubbish» and gross distortions of object shape. At that, «Red Eraser» is provided for object deletion (keep Shift pressed), whereas «Blue Eraser» (Ctrl key pressed) cuts the object up.*

You may correct line form with Camber Editor  *(hot-key 3).*

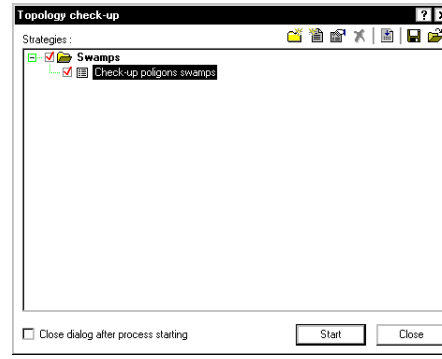
Shift/Resize Polyline tool  *(hot key R) changes the size of the closed contour by a specified value.*

1. After shape correction, fulfil the test for mutual and self crossings.



2. Select *Topology ->Topology Check-up* in *Utilities* menu.

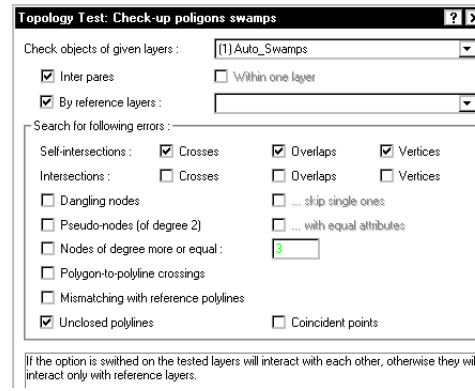
3. Select the *Check-up swamp polygons* strategy or specify operation parameters as it is shown in the figure.



4. Click *Start*. When the test is over, you will see a window with information about revealed errors.

5. Close the window.

6. The program automatically shifts the working window towards the first found error and selects the error mark.
   Relevant object becomes selected automatically when you delete the mark with Del key.



7. Use hot keys F and V to travel from one mark to another.

8. After correction, repeat items 1 - 7 until you see the message «No errors found».