APPENDIX D

PRIMARY HEADWATER HABITAT EVALUATION INDEX (HHEI) FOR STREAMS

CVE CHAGRIN VALLEY ENGINEERING, LTD
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OhioEPA Primary Headwater Habitat Evaluation Form

HHEI Score (sum of metrics 1, 2, 3) : **43**

SITE NAME/LOCATION: Vrooman Road Property Leroy Twp, Ohio

Stream 2 SITE NUMBER: | RIVER BASIN: Grand River | DRAINAGE AREA (mi²): 0.06

LENGTH OF STREAM REACH (ft): 200 | LAT.: 41.70320 | LONG.: -81.17510 | RIVER CODE: | RIVER MILE: 12.24

DATE: 11/08/12 | SCORER: TS | COMMENTS: Modified Class II PHWH

NOTE: Complete All Items On This Form - Refer to "Field Evaluation Manual for Ohio's PHWH Streams" for Instructions

STREAM CHANNEL MODIFICATIONS: ☐ NONE / NATURAL CHANNEL ☐ RECOVERED ☑ RECOVERING ☐ RECENT OR NO RECOVERY

1. SUBSTRATE (Estimate percent of every type of substrate present. Check *ONLY* two predominant substrate *TYPE* boxes (Max of 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

TYPE		PERCENT
☐	BLDR SLABS [16 pts]	0%
☐	BOULDER (>256 mm) [16 pts]	0%
☐	BEDROCK [16 pt]	0%
☐	COBBLE (65-256 mm) [12 pts]	0%
☐	GRAVEL (2-64 mm) [9 pts]	5%
☑	SAND (<2 mm) [6 pts]	40%

TYPE		PERCENT
☑	SILT [3 pt]	45%
☐	LEAF PACK/WOODY DEBRIS [3 pts]	10%
☐	FINE DETRITUS [3 pts]	0%
☐	CLAY or HARDPAN [0 pt]	0%
☐	MUCK [0 pts]	0%
☐	ARTIFICIAL [3 pts]	0%

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock: 0.00% (A) | 100% (B)

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: 9 | TOTAL NUMBER OF SUBSTRATE TYPES: 4

HHEI Metric Points

Substrate Max = 40: 13

A + B

2. Maximum Pool Depth *(Measure the maximum pool depth within the 61 meter (200 ft)* evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check *ONLY* one box):

- ☐ > 30 centimeters [20 pts]
- ☐ > 22.5 - 30 cm [30 pts]
- ☑ > 10 - 22.5 cm [25 pts]
- ☐ > 5 cm - 10 cm [15 pts]
- ☐ < 5 cm [5 pts]
- ☐ NO WATER OR MOIST CHANNEL [0 pts]

COMMENTS: | MAXIMUM POOL DEPTH (centimeters): 17

Pool Depth Max = 30: 25

3. BANK FULL WIDTH (Measured as the average of 3-4 measurements) (Check *ONLY* one box):

- ☐ > 4.0 meters (> 13') [30 pts]
- ☐ > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]
- ☐ > 1.5 m - 3.0 m (> 5' 7" - 9' 7") [20 pts]
- ☐ > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts]
- ☑ ≤ 1.0 m (<=3' 3") [5 pts]

COMMENTS: | AVERAGE BANKFULL WIDTH (meters): 0.30

Bankfull Width Max=30: 5

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY ☆NOTE: River Left (L) and Right (R) as looking downstream☆

RIPARIAN WIDTH (Per Bank) L	R	FLOODPLAIN QUALITY (Most Predominant per Bank) L	R		L	R
☐	☐	Wide >10m	☐	☐	Mature Forest, Wetland	☐	☐	Conservation Tillage
☐	☑	Moderate 5-10m	☐	☑	Immature Forest, Shrub or Old Field	☑	☐	Urban or Industrial
☑	☐	Narrow <5m	☐	☐	Residential, Park, New Field	☐	☐	Open Pasture, Row Crop
☐	☐	None	☐	☐	Fenced Pasture	☐	☐	Mining or Construction

COMMENTS:

FLOW REGIME *(At Time of Evaluation)* (Check *ONLY* one box):

- ☑ Stream Flowing
- ☐ Subsurface flow with isolated pools (Interstitial)
- ☐ Moist Channel, isolated pools, no flow (Intermittent)
- ☐ Dry channel, no water (Ephemeral)

COMMENTS:

SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check *ONLY* one box):

- ☐ None
- ☐ 0.5
- ☐ 1.0
- ☐ 1.5
- ☑ 2.0
- ☐ 2.5
- ☐ 3.0
- ☐ >3

STREAM GRADIENT ESTIMATE

☐ Flat (0.5 ft/100 ft) ☑ Flat to Moderate ☐ Moderate (2 ft/100 ft) ☐ Moderate to Severe ☐ Severe (10 ft/100 ft)

ADDITIONAL STREAM INFORMATION (This Information Must Also be Completed): Stream 2 - CVE 11227

QHEI PERFORMED? - [ ] Yes [✓] No QHEI Score [ ] (If Yes, Attach Completed QHEI Form)

DOWNSTREAM DESIGNATED USE(S)

[ ] WWH Name: [ ] Distance from Evaluated Stream [ ]

[ ] CWH Name: [ ] Distance from Evaluated Stream [ ]

[✓] EWH Name: Grand River Distance from Evaluated Stream 1.30

MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION

USGS Quadrangle Name: Painesville NRCS Soil Map Page: [ ] NRCS Soil Map Stream Order [ ]

County: Lake Township / City: Leroy

MISCELLANEOUS

Base Flow Conditions? (Y/N): Y Date of last precipitation: 11/03/12 Quantity: 0.04

Photograph Information: [ ]

Elevated Turbidity? (Y/N): N Canopy (% open): 10%

Were samples collected for water chemistry? (Y/N): N (Note lab sample no. or id. and attach results) Lab Number: NA

Field Measures: Temp (°C) [ ] Dissolved Oxygen (mg/l) [ ] pH (S.U.) [ ] Conductivity (µmhos/cm) [ ]

Is the sampling reach representative of the stream (Y/N) Y If not, please explain: [ ]

Additional comments/description of pollution impacts: [ ]

BIOTIC EVALUATION

Performed? (Y/N): N (If Yes, Record all observations. Voucher collections optional. NOTE: all voucher samples must be labeled with the site ID number. Include appropriate field data sheets from the Primary Headwater Habitat Assessment Manual)

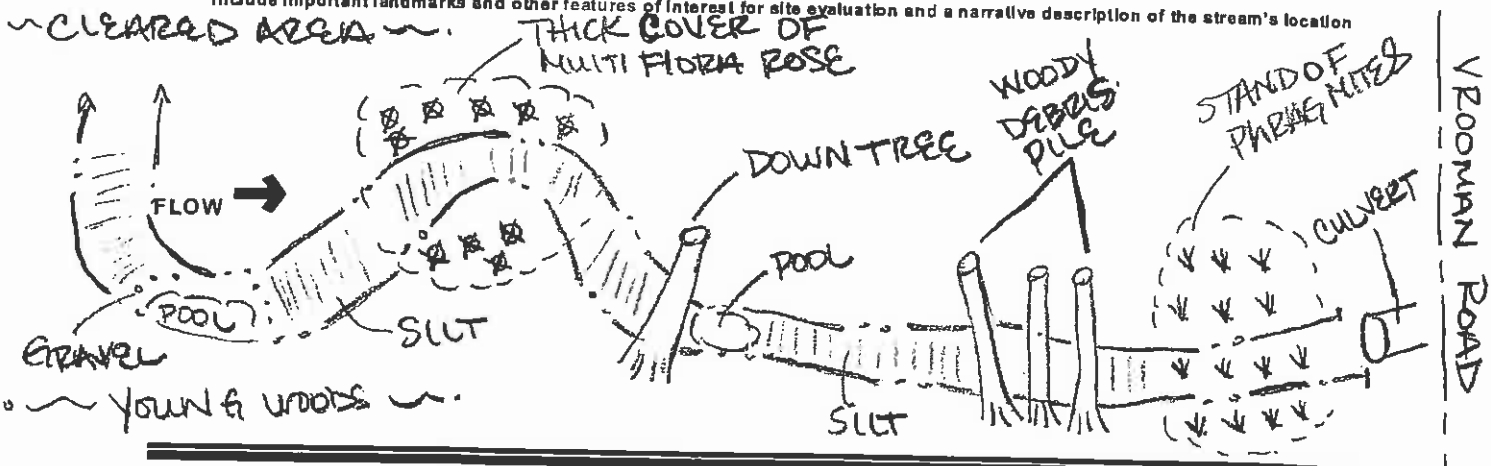
Fish Observed? (Y/N) N Voucher? (Y/N) N Salamanders Observed? (Y/N) N Voucher? (Y/N) N

Frogs or Tadpoles Observed? (Y/N) N Voucher? (Y/N) N Aquatic Macroinvertebrates Observed? (Y/N) N Voucher? (Y/N) N

Comments Regarding Biology: [ ]

DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed):

Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location



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OhioEPA Primary Headwater Habitat Evaluation Form

HHEI Score (sum of metrics 1, 2, 3) : **50**

SITE NAME/LOCATION: Vrooman Road Property Leroy Twp, Ohio
Stream 3 SITE NUMBER: _____ RIVER BASIN: Grand River DRAINAGE AREA (mi²): 0.06
LENGTH OF STREAM REACH (ft): 200 LAT.: 41.70130 LONG.: -81.17460 RIVER CODE: _____ RIVER MILE: 12.24
DATE: 11/08/12 SCORER: T. Snode COMMENTS: Modified Class II PHWH

NOTE: Complete All Items On This Form - Refer to "Field Evaluation Manual for Ohio's PHWH Streams" for Instructions

STREAM CHANNEL MODIFICATIONS: ☐ NONE / NATURAL CHANNEL ☐ RECOVERED ☑ RECOVERING ☐ RECENT OR NO RECOVERY

1. SUBSTRATE (Estimate percent of every type of substrate present. Check *ONLY* two predominant substrate *TYPE* boxes (Max of 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

TYPE		PERCENT
☐	BLDR SLABS [16 pts]	0%
☐	BOULDER (>256 mm) [16 pts]	0%
☐	BEDROCK [16 pt]	0%
☐	COBBLE (65-256 mm) [12 pts]	5%
☑	GRAVEL (2-64 mm) [9 pts]	50%
☑	SAND (<2 mm) [6 pts]	30%

TYPE		PERCENT
☐	SILT [3 pt]	10%
☐	LEAF PACK/WOODY DEBRIS [3 pts]	5%
☐	FINE DETRITUS [3 pts]	0%
☐	CLAY or HARDPAN [0 pt]	0%
☐	MUCK [0 pts]	0%
☐	ARTIFICIAL [3 pts]	0%

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock: 5.00% (A) — Substrate Percentage Total: 100% (B)

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: 15 TOTAL NUMBER OF SUBSTRATE TYPES: 5

HHEI Metric Points
Substrate Max = 40: 20
A + B

2. Maximum Pool Depth *(Measure the maximum pool depth within the 61 meter (200 ft)* evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check *ONLY* one box):

☐ > 30 centimeters [20 pts]
☐ > 22.5 - 30 cm [30 pts]
☑ > 10 - 22.5 cm [25 pts]
☐ > 5 cm - 10 cm [15 pts]
☐ < 5 cm [5 pts]
☐ NO WATER OR MOIST CHANNEL [0 pts]

COMMENTS: _____ MAXIMUM POOL DEPTH (centimeters): 21

Pool Depth Max = 30: 25

3. BANK FULL WIDTH (Measured as the average of 3-4 measurements) (Check *ONLY* one box):

☐ > 4.0 meters (> 13') [30 pts]
☐ > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]
☐ > 1.5 m - 3.0 m (> 4' 8" - 9' 7") [20 pts]
☐ > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts]
☑ ≤ 1.0 m (<= 3' 3") [5 pts]

COMMENTS: _____ AVERAGE BANKFULL WIDTH (meters): 0.70

Bankfull Width Max=30: 5

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY ☆NOTE: River Left (L) and Right (R) as looking downstream☆

RIPARIAN WIDTH (Per Bank)	L	R
Wide >10m	☑	☐
Moderate 5-10m	☐	☐
Narrow <5m	☐	☑
None	☐	☐

FLOODPLAIN QUALITY (Most Predominant per Bank)	L	R
Mature Forest, Wetland	☐	☐
Immature Forest, Shrub or Old Field	☑	☐
Residential, Park, New Field	☐	☐
Fenced Pasture	☐	☐
Conservation Tillage	☐	☐
Urban or Industrial	☐	☑
Open Pasture, Row Crop	☐	☐
Mining or Construction	☐	☐

COMMENTS: _____

FLOW REGIME *(At Time of Evaluation)* (Check *ONLY* one box):

☑ Stream Flowing
☐ Subsurface flow with isolated pools (Interstitial)
☐ Moist Channel, isolated pools, no flow (Intermittent)
☐ Dry channel, no water (Ephemeral)

COMMENTS: _____

SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check *ONLY* one box):

☐ None ☐ 0.5 ☐ 1.0 ☐ 1.5 ☐ 2.0 ☐ 2.5 ☐ 3.0 ☑ >3

STREAM GRADIENT ESTIMATE

☐ Flat (0.5 ft/100 ft) ☑ Flat to Moderate ☐ Moderate (2 ft/100 ft) ☐ Moderate to Severe ☐ Severe (10 ft/100 ft)

ADDITIONAL STREAM INFORMATION (This Information Must Also be Completed): Stream 3 - CVE 11227

QHEI PERFORMED? - ☐ Yes ☑ No QHEI Score _____ (If Yes, Attach Completed QHEI Form)

DOWNSTREAM DESIGNATED USE(S)

☐ WWH Name:		Distance from Evaluated Stream
☐ CWH Name:		Distance from Evaluated Stream
☑ EWH Name:	Grand River	Distance from Evaluated Stream 1.30

MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION

USGS Quadrangle Name: Painesville NRCS Soil Map Page: _____ NRCS Soil Map Stream Order _____

County: Lake Township / City: Leroy

MISCELLANEOUS

Base Flow Conditions? (Y/N): Y Date of last precipitation: 11/03/12 Quantity: 0.04

Photograph Information: _____

Elevated Turbidity? (Y/N): N Canopy (% open): 25%

Were samples collected for water chemistry? (Y/N): N (Note lab sample no. or Id. and attach results) Lab Number: NA

Field Measures: Temp (°C) _____ Dissolved Oxygen (mg/l) _____ pH (S.U.) _____ Conductivity (µmhos/cm) _____

Is the sampling reach representative of the stream (Y/N) Y If not, please explain: _____

Additional comments/description of pollution impacts: _____

BIOTIC EVALUATION

Performed? (Y/N): N (If Yes, Record all observations. Voucher collections optional. NOTE: all voucher samples must be labeled with the site ID number. Include appropriate field data sheets from the Primary Headwater Habitat Assessment Manual)

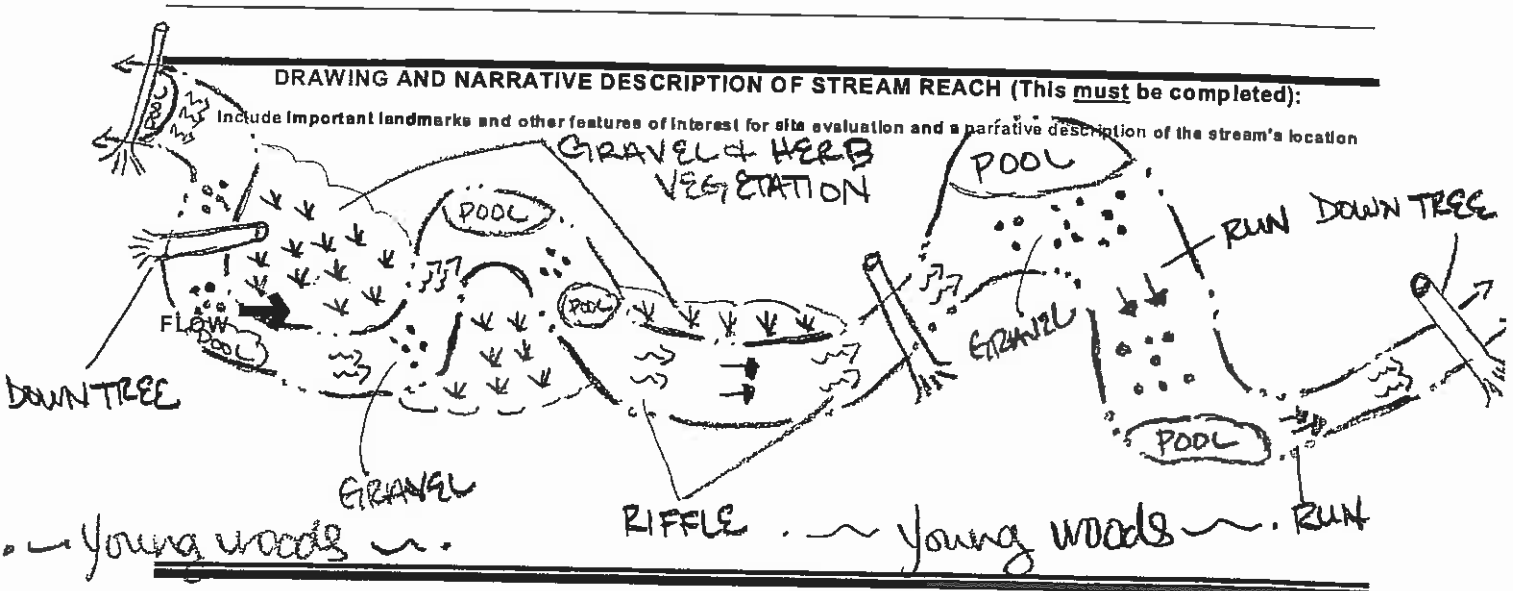
Fish Observed? (Y/N) N Voucher? (Y/N) N Salamanders Observed? (Y/N) N Voucher? (Y/N) N

Frogs or Tadpoles Observed? (Y/N) N Voucher? (Y/N) N Aquatic Macroinvertebrates Observed? (Y/N) N Voucher? (Y/N) N

Comments Regarding Biology: _____

DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed):

Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location



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APPENDIX D
OHIO RAPID ASSESSMENT METHOD FOR WETLANDS

CVE CHAGRIN VALLEY ENGINEERING, LTD
Creative Engineers Intelligent Solutions

Ohio Rapid Assessment Method for Wetlands (ORAM)-Background Form

Contact Information		
	Applicant:	Agent:
Company Name:	JJJ Properties, LLC	Chagrin Valley Engineering, Inc.
Address:	5585 Canal Road	22999 Forbes Road, Suite B
City, State, Zip:	Valley View, OH 44128	Cleveland, Ohio 44146
Contact Person:	Mr. Carmen Carbone	Larry Ludwig
Phone Number(s):	(216) 447-0814	(440) 439-1999
E-Mail Address:		ludwig@cvelimited.com

Project Information		
Project Name: Vrooman Road		
Street: Vrooman Road	**City/Township:** Leroy Twp	**County:** Lake
Watershed (8-Digit HUC): 04110004 Grand River		**USGS Quad:** Painesville
NWI Map: (Painesville) No wetlands indicated on site		
Soil Survey: (Lake) Indicates presence of following soil series: MhB, PeC2, PsB & UdB none of which are listed has being hydric soils and none are listed as potentially having hydric inclusions.		
Delineation Report/Mapping: Full wetland delineation report & maps including: location, USGS, NWI, Soils and wetland delineation was completed by Flickinger Wetland Services Group, Inc.		
Date(s) of Site Visit(s): 11/8/12		
USACE District: Buffalo	**Affirmed by Corps:** Yes 10/14/2010	**Agent:** Gronceski (DA 2009-01681)

Wetland Information					
Wetland	**Acreage**	**Category (Final Score)**	**HGM Class**	**Vegetation Community Class**	**Lat/Long Coordinates**
B, C, D, E	1.532	Mod 2 (35)	Riverine Depression, open, mineral soils	Mixed Emergent, Shrub, Forest	41.7033 -81.1739
F, G, H	0.775	Mod 2 (38)	Riverine,open, mineral soils	Mixed Emergent, Shrub	41.7013 -81.1746

*Wetland sketch information including north arrow, relationship with other surface waters and vegetation zones included on attached ORAM Information Map.

N

LEGEND

- EMERGENT WETLAND – DOMINATED BY INVASIVE SPECIES
- WETLAND NOT IMPACTED BY PROJECT
- EMERGENT WETLAND MIX WITH FOREST & SHRUB AREAS
- STREAM
- AREA DELINEATED – DELINEATION COMPLETED BY FLICKINGER GROUP & CONFIRMED BY USACE

Rev. No.	Date	By	Remarks

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ORAM INFORMATION MAP
VROOMAN ROAD
LEROY TOWNSHIP
LAKE COUNTY, OHIO

DATE: 11/12 SCALE: N/A

PROJECT NO.: 11227

Wetlands B, C, D, E

#	Steps in properly establishing scoring boundaries	Done?	Not Applicable
Step 1	Identify the wetland area of interest. This may be the site of a proposed impact, a mitigation site, conservation site, etc.	**X**	
Step 2	Identify the locations where there is physical evidence that hydrology changes rapidly. Such evidence includes both the natural and human-induced changes including, constrictions, caused by berms or dikes, points where water velocity changes rapidly at rapids or falls, points where significant inflows occur at the confluence of rivers, or other factors that may restrict hydrologic interaction between the wetlands or parts of a single wetland.	**X**	
Step 3	Delineate the boundary of the wetland to be rated such that all areas of interest that are contiguous to and within areas where the hydrology does not change significantly, i.e. areas that have a high degree of hydrologic interaction are included within the scoring boundary.	X	
Step 4	Determine if artificial boundaries such as property lines, state lines, roads, railroad embankments are present. These should not be used to establish scoring boundaries unless they coincide with areas where hydrologic regime changes.	X	
Step 5	In all instances the Rater may enlarge the minimum scoring boundaries discussed here to score together wetlands that could be scored separately.		X
Step 6	Consult ORAM Manual Section 5.0 for how to establish scoring boundaries for wetlands that form a patchwork on the landscape, divided by artificial boundaries, contiguous to streams, lakes or rivers or for dual classifications.	**X**	

Wetlands B, C, D, E

#	Question	Yes	No
#1	Critical Habitat		X
#2	Threatened or Endangered Species		X
#3	Documented High Quality Wetland		X
#4	Significant Breeding or Concentration Area		X
#5	Category 1 Wetlands		X
#6	Bogs		X
#7	Fens		X
#8a	"Old Growth Forest"		X
#8b	Mature forested wetlands		X
#9a	Lake Erie coastal and tributary wetlands; if **Yes** continue to Question # 9b; if **No** continue on to Question #10		X
#9b	Is the wetland partially hydrologically restricted from Lake Erie due to lakeward or landward dikes or other hydrological controls?		
#9c	Are Lake Erie water levels the wetlands primary hydrological influence?		
#9d	Does the wetland have a predominance of native species within its vegetation communities, although non-native or disturbance tolerant species can also be present?		
#9e	Does the wetland have predominance of non-native or disturbance tolerant native plant species?		
#10	Lake Plain Sand Prairies (Oak Openings)		X
#11	Relict Wet Prairies		X

ORAM v. 5.0 Field Form Quantitative Rating

Site:	Vrooman Rd, 11227	Rater(s):	TS / DK	Date:	11/12 Rvsd 2/13

2	2
max 6 pts	subtotal

Wetland: B, C, D, E; 0.082, 0.997, 0.449, 0.004

35	2
Final Score	Category

Metric 1. Wetland Area (size).

Select one size class and assign score.

		> 50 acres (<20.2ha) (6 pts)
		25 to <50 acres (10.1 to <20.2ha) (5 pts)
2		10 to <25 acres (4 to <10.1ha) (4 pts)
		3 to 10<acres (1.2 to <4ha) (3 pts)
	2	0.3 to <3 acres (0.12 to <1.2ha) (2 pts)
		0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
		<0.1 acres (0.04ha) (0 pts)

4	6
max 14 pts	subtotal

Metric 2. Upland buffers and surrounding land use.

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

		WIDE. Buffers average 50m (164 ft) or more around wetland perimter (7)
1		MEDIUM. Buffers average 25m to <50m (82 to <164 ft) around wetland perimeter (4)
	1	NARROW. Buffers average 10m to <25m (32 ft to <82 ft) around wetland perimter (1)
		VERY NARROW. Buffers average <10m (<32ft) around wetland perimter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

		VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
3	5	LOW. Old field (>10 years), shrubland, young second growth forest. (5)
		MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
	1	HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

12	18
max 30 pts	subtotal

Metric 3. Hydrology.

3a. Sources of water. Score all that apply.

		High pH groundwater (5)
		Other groundwater (3)
4	1	Precipitation (1)
	3	Seasonal/intermittent surface water (3)
		Perennial surface water (lake or stream) (5)

2

3b. Connectivity. Score all that apply.

	100 year floodplain (1)
1	Between stream/lake and other human use (1)
1	Part of wetland/upland (e.g. forest), complex (1)
	Part of riparian or upland corridor (1)

3c. Maximum water depth. Select only one and assign score.

		>0.7 (27.6in) (3)
1		04. to 0.7m (15.7 to 27.6in) (2)
	1	>0.4m (<15.7in) (1)

2

3d. Duration inundation/saturation. Score one or dbl check.

	Semi-to permanently inundated/saturated (4)
	Regularly inundated/saturated (3)
2	Seasonally inundated (2)
	Seasonally saturated in upper 30 cm (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

		None or none apparent (12)
		Recovered (7)
3	3	Recovering (3)
		Recent or no recovery (1)

Check all disturbances observed

X	ditch		point source (non stormwater)
	tile	X	filling/grading
	dike		road bed/RR track
	weir		dredging
X	stormwater input	X	other Road, Culvert

10	28
max 20 pts	subtotal

Metric 4. Habitat alteration and development.

4a. Substrate disturbance. Score one or double check and average.

		None or none apparent (4)
2.5	3	Recovered (3)
	2	Recovering (2)
		Recent or no recovery (1)

4.5

4c. Habitat alteration. Score one or double check and average.

	None or none apparent (9)
6	Recovered (6)
3	Recovering (3)
	Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

		Excellent (7)
		Very good (6)
		Good (5)
3		Moderately good (4)
	3	Fair (3)
		Poor to fair (2)
		Poor (1)

Check all disturbances observed

	mowing		shrub/sapling removal
	grazing		herbaceous/aquatic bed removal
	clearcutting	X	sedimentation
X	selective cutting		dredging
	woody debris removal		farming
X	toxic pollutants		nutrient enrichment

28
Subtotal this page

last revised 1 February 2001 jjm

ORAM v. 5.0 Field Form Quantitative Rating

Site:	Vrooman Rd, 11227	Rater(s):	TS / DK	Date:	11/12 Rvsd 2/13
				Wetland:	B, C, D, E; 0.082, 0.997, 0.449, 0.004

28
Subtotal1st page

0 (max 10 pts) | 28 (subtotal)

Metric 5. Special Wetlands

Check all that apply and score as indicated.

0

- [ ] Bog (10)
- [ ] Fen (10)
- [ ] Old growth forest (10)
- [ ] Mature forested wetland (5)
- [ ] Lake Erie Coastal/tributary wetland-unrestricted hydrology (10)
- [ ] Lake Erie Coastal/tributary wetland-restricted hydrology (5)
- [ ] Lake Plain Sand Prairies (Oak Openings) (10)
- [ ] Relict Wet Prairies (10)
- [ ] Known occurrence state/federal threatened or endangered species (10)
- [ ] Significant migratory songbird/water fowl habitat or usage (10)
- [ ] Category 1 Wetland. See question 1 Qualitative Rating - 10

7 (max 20 pts) | 35 (subtotal)

Metric 6. Plant communities, interspersion, microtopography.

6a. Wetland Vegetation Communities

Score all present using 0 to 3 scale.

5

- [ ] Aquatic bed
- [2] Emergent
- [1] Shrub
- [2] Forest
- [ ] Mudflats
- [ ] Open water
- [ ] Other

6b. Horizontal (plan view) interspersion.

Select only one.

2

- [ ] High (5)
- [ ] Moderately high (4)
- [ ] Moderate (3)
- [2] Moderately low (2)
- [ ] Low (1)
- [ ] None (0)

6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage.

-3

- [ ] Extensive >75% cover (-5)
- [-3] Moderate 25-75% cover (-3)
- [ ] Sparse 5-25% cover (-1)
- [ ] Nearly absent <5% cover (0)
- [ ] Absent (1)

6d. Microtopoghraphy

Score all present using 1 to 3 scale.

3

- [1] Vegetated hummocks/tussocks
- [1] Coarse woody debris > 15cm (6in)
- [1] Standing dead >25cm (10in) dbh
- [ ] Amphibian breeding pools

Vegetation Community Cover Scale	
0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Preset and either commprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality.
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of hgh quality.
3	Present and comprises significant part or more of wetland's vegetation and is of high quality.

Narrative Description of Vegetation Quality	
low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or distrubance tolerant native spp can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare, threatened or endangered spp.
high	A predominance of native species, with nonative spp and/or disturbance tolerant native spp apbsent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened or endangered spp

Mudflat and Open Water Class Quality	
0	Absent
1	Low 0.1 to 1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

Microtopography Cover Scale	
0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

35 GRAND TOTAL (max 100 pts) last revised 1 February 2001 jjm

Refer to the most recent ORAM Score Calibration Report for the scoring breakpoints between wetland categories at the following address http://www.epa.state.oh.us/dsw/401/401.html

Ohio Rapid Assessment Method for Wetlands – Summary Worksheet

Wetlands B, C, D, E

Narrative Rating	Question 1. Critical Habitat	Yes (No)	If yes, Category 3
	Question 2. Threatened or Endangered Species	Yes (No)	If yes, Category 3
	Question 3. High Quality Natural Wetland	Yes (No)	If yes, Category 3
	Question 4. Significant Bird Habitat	Yes (No)	If yes, Category 3
	Question 5. Category 1 Wetlands	Yes (No)	If yes, Category 1
	Question 6. Bogs	Yes (No)	If yes, Category 3
	Question 7. Fens	Yes (No)	If yes, Category 3
	Question 8a. Old Growth Forest	Yes (No)	If yes, Category 3
	Question 8b. Mature Forested Wetland	Yes (No)	If yes, evaluate for Category 3; may also be 1 or 2
	Question 9b. Lake Erie Wetlands-Restricted	Yes (No)	If yes, evaluate for Category 3; may also be 1 or 2
	Question 9d. Lake Erie Wetlands-Unrestricted with native plants	Yes (No)	If yes, Category 3
	Question 9e. Lake Erie Wetlands-Unrestricted with invasive plants	Yes (No)	If yes, evaluate for Category 3; may also be 1 or 2
	Question 10. Oak Openings	Yes (No)	If yes, Category 3
	Question 11. Relict Wet Prairies	Yes (No)	If yes, evaluate for Category 3; may also be 1 or 2
Quantitative Rating	Metric 1. Size	2	
	Metric 2. Buffers and Surrounding Land Use	4	
	Metric 3. Hydrology	12	
	Metric 4. Habitat	10	
	Metric 5. Special Wetland Communities	0	
	Metric 6. Plant Communities, Interspersion, Microtopography	7	
	TOTAL SCORE	35	

Wetland B, C, D, E

Choices	Circle One		Evaluation of Categorization Result of ORAM
Did you answer "Yes" to any of the following questions: Narrative Rating Nos. 2, 3, 4, 6, 7, 8a, 9d, 10	YES Wetland is categorized as a Category 3 wetland	(NO)	Is quantitative rating score *less* than the Category 2 scoring threshold (excluding gray zone)? If yes, reevaluate the category of the wetland using the narrative criteria in OAC Rule 3745-1-54© and biological and/or functional assessments to determine if the wetland has been over-categorized by the ORAM.
Did you answer "Yes" to any of the following questions: Narrative Rating Nos. 1, 8b, 9b, 9e, 11	YES Wetland should be evaluated for possible Category 3 status	(NO)	Evaluate the wetland using the 1) narrative criteria in OAC Rule 3745-1-54© and 2) the quantitative rating score. If the wetland is determined to be a Category 3 wetland using either of these, it should be categorized as a Category 3 wetland. Detailed biological and/or functional assessments may also be used to determine the wetland's category.
Did you answer "Yes" to Narrative Rating No. 5	YES Wetland is categorized as a Category 1 wetland	(NO)	Is quantitative rating score *greater* than the Category 2 scoring threshold (excluding gray zone)? If yes, reevaluate the category of the wetland using the narrative criteria in OAC Rule 3745-1-54© and biological and/or functional assessments to determine if the wetland has been under-categorized by the ORAM.
Does the quantitative score fall within the scoring range of a Category 1, 2, or 3 wetland?	(YES) Wetland is assigned to the appropriate category based on the scoring range.	NO	If the score of the wetland is located within the scoring range for a particular category, the wetlands should be assigned to that category. In all instances however, the narrative criteria described in OAC Rule 3745-1-54 © can be used to clarify or change a categorization based on a quantitative score.
Does the quantitative score fall within the "*gray zone*" of a Category 1, 2, or 3 wetland?	YES Wetland is assigned to the higher of the two categories or assigned to a category based on detailed assessments and narrative criteria.	(NO)	Rater has the option of assigning the wetland to the higher of the two categories or to assign a category based on the results of a non-rapid wetland assessment method, e.g. functional assessment, biological assessment, etc, and a consideration of the narrative criteria in OAC Rule 3745-1-54 ©.
Does the wetland otherwise exhibit *moderate* OR *superior* hydrologic OR habitat, OR recreational functions AND the wetland was *not* categorized as a Category 2 wetland (in the case of moderate functions) or a Category 3 wetland (in the case of superior functions) by this method?	YES Wetland was under-categorized by this method. A written justification for re-categorization should be provided on Background Information Form.	(NO)	A wetland may be under-categorized using this method, but still exhibit one or more superior functions, e.g. a wetland's biotic communities may be degraded by human activities, but the wetland may still exhibit superior hydrologic functions because of its type, landscape position, size, local or regional significance, etc. In this circumstance, the narrative criteria in OAC Rule 3745-1-54 © (2) and (3) are controlling, and the under-categorization should be corrected. A written justification with supporting reasons or information for this determination should be provided.

FINAL CATEGORY:
Category 2

Wetlands F, G, H

#	Steps in properly establishing scoring boundaries	Done?	Not Applicable
Step 1	Identify the wetland area of interest. This may be the site of a proposed impact, a mitigation site, conservation site, etc.	X	
Step 2	Identify the locations where there is physical evidence that hydrology changes rapidly. Such evidence includes both the natural and human-induced changes including, constrictions, caused by berms or dikes, points where water velocity changes rapidly at rapids or falls, points where significant inflows occur at the confluence of rivers, or other factors that may restrict hydrologic interaction between the wetlands or parts of a single wetland.	X	
Step 3	Delineate the boundary of the wetland to be rated such that all areas of interest that are contiguous to and within areas where the hydrology does not change significantly, i.e. areas that have a high degree of hydrologic interaction are included within the scoring boundary.	X	
Step 4	Determine if artificial boundaries such as property lines, state lines, roads, railroad embankments are present. These should not be used to establish scoring boundaries unless they coincide with areas where hydrologic regime changes.	X	
Step 5	In all instances the Rater may enlarge the minimum scoring boundaries discussed here to score together wetlands that could be scored separately.		X
Step 6	Consult ORAM Manual Section 5.0 for how to establish scoring boundaries for wetlands that form a patchwork on the landscape, divided by artificial boundaries, contiguous to streams, lakes or rivers or for dual classifications.	X	

Wetlands F, G, H

#	Question	Yes	No
#1	Critical Habitat		X
#2	Threatened or Endangered Species		X
#3	Documented High Quality Wetland		X
#4	Significant Breeding or Concentration Area		X
#5	Category 1 Wetlands		X
#6	Bogs		X
#7	Fens		X
#8a	"Old Growth Forest"		X
#8b	Mature forested wetlands		X
#9a	Lake Erie coastal and tributary wetlands; if **Yes** continue to Question # 9b; if **No** continue on to Question #10		X
#9b	Is the wetland partially hydrologically restricted from Lake Erie due to lakeward or landward dikes or other hydrological controls?		
#9c	Are Lake Erie water levels the wetlands primary hydrological influence?		
#9d	Does the wetland have a predominance of native species within its vegetation communities, although non-native or disturbance tolerant species can also be present?		
#9e	Does the wetland have predominance of non-native or disturbance tolerant native plant species?		
#10	Lake Plain Sand Prairies (Oak Openings)		X
#11	Relict Wet Prairies		X

ORAM v. 5.0 Field Form Quantitative Rating

Site:	Vrooman Rd. 11227	Rater(s):	TS / DK	Date:	11/12 Rvsd 2/13

2	2
max 6 pts	subtotal

Wetland: F, G, H; 0.225, 0.023, 0.527

38	2
Final Score	Category

Metric 1. Wetland Area (size).

Select one size class and assign score.

		> 50 acres (<20.2ha) (6 pts)
		25 to <50 acres (10.1 to <20.2ha) (5 pts)
2		10 to <25 acres (4 to <10.1ha) (4 pts)
		3 to 10<acres (1.2 to <4ha) (3 pts)
	2	0.3 to <3 acres (0.12 to <1.2ha) (2 pts)
		0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
		<0.1 acres (0.04ha) (0 pts)

4	6
max 14 pts	subtotal

Metric 2. Upland buffers and surrounding land use.

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

		WIDE. Buffers average 50m (164 ft) or more around wetland perimter (7)
1		MEDIUM. Buffers average 25m to <50m (82 to <164 ft) around wetland perimeter (4)
	1	NARROW. Buffers average 10m to <25m (32 ft to <82 ft) around wetland perimter (1)
		VERY NARROW. Buffers average <10m (<32ft) around wetland perimter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

		VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
3	5	LOW. Old field (>10 years), shrubland, young second growth forest. (5)
		MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
	1	HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

14	20
max 30 pts	subtotal

Metric 3. Hydrology.

3a. Sources of water. Score all that apply.

		High pH groundwater (5)
		Other groundwater (3)
4	1	Precipitation (1)
	3	Seasonal/intermittent surface water (3)
		Perennial surface water (lake or stream) (5)

2

3b. Connectivity. Score all that apply.

	100 year floodplain (1)
1	Between stream/lake and other human use (1)
1	Part of wetland/upland (e.g. forest), complex (1)
	Part of riparian or upland corridor (1)

3c. Maximum water depth. Select only one and assign score.

		>0.7 (27.6in) (3)
1		04. to 0.7m (15.7 to 27.6in) (2)
	1	>0.4m (<15.7in) (1)

2

3d. Duration inundation/saturation. Score one or dbl check.

	Semi-to permanently inundated/saturated (4)
	Regularly inundated/saturated (3)
2	Seasonally inundated (2)
	Seasonally saturated in upper 30 cm (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

		None or none apparent (12)
	7	Recovered (7)
5	3	Recovering (3)
		Recent or no recovery (1)

Check all disturbances observed

X	ditch	X	point **source (non stormwater)**
	tile	X	filling/grading
	dike	X	road **bed/RR track**
	weir		dredging
	stormwater input		other

10	30
max 20 pts	subtotal

Metric 4. Habitat alteration and development.

4a. Substrate disturbance. Score one or double check and average.

		None or none apparent (4)
2.5	3	Recovered (3)
	2	Recovering (2)
		Recent or no recovery (1)

4.5

4c. Habitat alteration. Score one or double check and average.

	None or none apparent (9)
6	Recovered (6)
3	Recovering (3)
	Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

		Excellent (7)
		Very good (6)
		Good (5)
3		Moderately good (4)
	3	Fair (3)
		Poor to fair (2)
		Poor (1)

Check all disturbances observed

	mowing	X	shrub/sapling **removal**
	grazing		herbaceous/aquatic **bed removal**
	clearcutting	X	sedimentation
X	selective **cutting**		dredging
	woody **debris removal**		farming
X	toxic **pollutants**		nutrient **enrichment**

30
Subtotal this page

last revised 1 February 2001 jjm

ORAM v. 5.0 Field Form Quantitative Rating

Site:	Vrooman Rd. 11227	Rater(s):	TS / DK	Date:	11/12 Rvsd 2/13
		Wetland:	F, G, H; 0.225, 0.023, 0.527		

30
Subtotal1st page

0 (max 10 pts) | 30 (subtotal)

Metric 5. Special Wetlands

Check all that apply and score as indicated.

	Bog (10)
	Fen (10)
	Old growth forest (10)
	Mature forested wetland (5)
0	Lake Erie Coastal/tributary wetland-unrestricted hydrology (10)
	Lake Erie Coastal/tributary wetland-restricted hydrology (5)
	Lake Plain Sand Prairies (Oak Openings) (10)
	Relict Wet Prairies (10)
	Known occurrence state/federal threatened or endangered species (10)
	Significant migratory songbird/water fowl habitat or usage (10)
	Category 1 Wetland. See question 1 Qualitative Rating - 10

8 (max 20 pts) | 38 (subtotal)

Metric 6. Plant communities, interspersion, microtopography.

6a. Wetland Vegetation Communities

Score all present using 0 to 3 scale.

	Aquatic bed
1	Emergent
4	Shrub
2	Forest
	Mudflats
	Open water
	Other

6b. Horizontal (plan view) interspersion.

Select only one.

	High (5)
	Moderately high (4)
2	Moderate (3)
2	Moderately low (2)
	Low (1)
	None (o)

6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage.

	Extensive >75% cover (-5)
	Moderate 25-75% cover (-3)
0	Sparse 5-25% cover (-1)
0	Nearly absent <5% cover (0)
	Absent (1)

6d. Microtopoghraphy

Score all present using 1 to 3 scale.

1	Vegetated hummocks/tussocks
1	Coarse woody debris > 15cm (6in)
2	Standing dead >25cm (10in) dbh
	Amphibian breeding pools

Vegetation Community Cover Scale	
0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Preset and either commprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality.
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of hgh quality.
3	Present and comprises significant part or more of wetland's vegetation and is of high quality.

Narrative Description of Vegetation Quality	
low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or distrubance tolerant native spp can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare, threatened or endangered spp.
high	A predominance of native species, with nonative spp and/or disturbance tolerant native spp apbsent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened or endangered spp

Mudflat and Open Water Class Quality	
0	Absent
1	Low 0.1 to 1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

Microtopography Cover Scale	
0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

38 **GRAND TOTAL (max 100 pts)** last revised 1 February 2001 jjm

Refer to the most recent ORAM Score Calibration Report for the scoring breakpoints between wetland categories at the following address: http://www.epa.state.oh.us/dsw/401/401.html

Ohio Rapid Assessment Method for Wetlands – Summary Worksheet

Wetlands F, G, H

Narrative Rating	Question 1. Critical Habitat	Yes (No)	If yes, Category 3
	Question 2. Threatened or Endangered Species	Yes (No)	If yes, Category 3
	Question 3. High Quality Natural Wetland	Yes (No)	If yes, Category 3
	Question 4. Significant Bird Habitat	Yes (No)	If yes, Category 3
	Question 5. Category 1 Wetlands	Yes (No)	If yes, Category 1
	Question 6. Bogs	Yes (No)	If yes, Category 3
	Question 7. Fens	Yes (No)	If yes, Category 3
	Question 8a. Old Growth Forest	Yes (No)	If yes, Category 3
	Question 8b. Mature Forested Wetland	Yes (No)	If yes, evaluate for Category 3; may also be 1 or 2
	Question 9b. Lake Erie Wetlands-Restricted	Yes (No)	If yes, evaluate for Category 3; may also be 1 or 2
	Question 9d. Lake Erie Wetlands-Unrestricted with native plants	Yes (No)	If yes, Category 3
	Question 9e. Lake Erie Wetlands-Unrestricted with invasive plants	Yes (No)	If yes, evaluate for Category 3; may also be 1 or 2
	Question 10. Oak Openings	Yes (No)	If yes, Category 3
	Question 11. Relict Wet Prairies	Yes (No)	If yes, evaluate for Category 3; may also be 1 or 2
Quantitative Rating	Metric 1. Size	2	
	Metric 2. Buffers and Surrounding Land Use	4	
	Metric 3. Hydrology	14	
	Metric 4. Habitat	10	
	Metric 5. Special Wetland Communities	0	
	Metric 6. Plant Communities, Interspersion, Microtopography	8	
	TOTAL SCORE	38	

CVE

Ohio Rapid Assessment Method for Wetlands (ORAM) -Categorization Worksheet

Wetland F, G, H

Choices	Circle One		Evaluation of Categorization Result of ORAM
Did you answer "Yes" to any of the following questions: Narrative Rating Nos. 2, 3, 4, 6, 7, 8a, 9d, 10	YES Wetland is categorized as a Category 3 wetland	(NO)	Is quantitative rating score *less* than the Category 2 scoring threshold (excluding gray zone)? If yes, reevaluate the category of the wetland using the narrative criteria in OAC Rule 3745-1-54© and biological and/or functional assessments to determine if the wetland has been over-categorized by the ORAM.
Did you answer "Yes" to any of the following questions: Narrative Rating Nos. 1, 8b, 9b, 9e, 11	YES Wetland should be evaluated for possible Category 3 status	(NO)	Evaluate the wetland using the 1) narrative criteria in OAC Rule 3745-1-54© and 2) the quantitative rating score. If the wetland is determined to be a Category 3 wetland using either of these, it should be categorized as a Category 3 wetland. Detailed biological and/or functional assessments may also be used to determine the wetland's category.
Did you answer "Yes" to Narrative Rating No. 5	YES Wetland is categorized as a Category 1 wetland	(NO)	Is quantitative rating score *greater* than the Category 2 scoring threshold (excluding gray zone)? If yes, reevaluate the category of the wetland using the narrative criteria in OAC Rule 3745-1-54© and biological and/or functional assessments to determine if the wetland has been under-categorized by the ORAM.
Does the quantitative score fall within the scoring range of a Category 1, 2, or 3 wetland?	(YES) Wetland is assigned to the appropriate category based on the scoring range.	NO	If the score of the wetland is located within the scoring range for a particular category, the wetlands should be assigned to that category. In all instances however, the narrative criteria described in OAC Rule 3745-1-54 © can be used to clarify or change a categorization based on a quantitative score.
Does the quantitative score fall within the "*gray zone*" of a Category 1, 2, or 3 wetland?	YES Wetland is assigned to the higher of the two categories or assigned to a category based on detailed assessments and narrative criteria.	(NO)	Rater has the option of assigning the wetland to the higher of the two categories or to assign a category based on the results of a non-rapid wetland assessment method, e.g. functional assessment, biological assessment, etc, and a consideration of the narrative criteria in OAC Rule 3745-1-54 ©.
Does the wetland otherwise exhibit *moderate* OR *superior* hydrologic OR habitat, OR recreational functions AND the wetland was *not* categorized as a Category 2 wetland (in the case of moderate functions) or a Category 3 wetland (in the case of superior functions) by this method?	YES Wetland was under-categorized by this method. A written justification for re-categorization should be provided on Background Information Form.	(NO)	A wetland may be under-categorized using this method, but still exhibit one or more superior functions, e.g. a wetland's biotic communities may be degraded by human activities, but the wetland may still exhibit superior hydrologic functions because of its type, landscape position, size, local or regional significance, etc. In this circumstance, the narrative criteria in OAC Rule 3745-1-54 © (2) and (3) are controlling, and the under-categorization should be corrected. A written justification with supporting reasons or information for this determination should be provided.

FINAL CATEGORY:
Category 2

APPENDIX D
INDIANA BAT MIST NET SURVEY REPORT

CVE CHAGRIN VALLEY ENGINEERING, LTD
Creative Engineers. Intelligent Solutions

Indiana Bat Survey
ODOT Vrooman Road Site
Leroy TWP Lake County
Project 11227

June 15 and 16, 2013

Prepared for;
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June 17, 2013

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1.0 INTRODUCTION AND SITE DESCRIPTION

On the nights of June 15 and 16, 2013 an Indiana Bat mist-net survey was conducted at the ODOT Facility on Vrooman Road in Leroy TWP of Lake County Ohio, (**Appendix A: Maps 1,2, 3**), The site is located at the southeast corner of the intersection of I-90 and Vrooman Road. The survey site is bordered by Vrooman Road to the west, Carter Road to the south, a High Tension Corridor to the east and a developed ODOT site with Office buildings and storage

facilities to the north. The vast majority of the survey site is comprised of open area used as storage of road millings, concrete abutments, and construction supplies. This area is accessed off Vrooman Road in the central portion of the survey site. Wooded areas of the survey site are limited to a small couple of acre woodlot in the southern portion marked as Region 1. (**Appendix D: Photo 1)** and a border along the western central portion and adjacent to Vrooman Road marked as Region 2. (**Appendix D: Photo 1)** A thin shrubby tree line partially bisected the site's northern border and marked as Region 3. (**Appendix D: Photo 1**). The western portion of the study site is open field and storage for road millings (Region 4) and the central portion, Region 5 is also open and used to as a storage yard for construction materials(**Appendix D: Photo 1**).

Regions 1 and 2, which offered the most potential having wooded conditions for mist netting, are bisected by the entrance drive to the survey site (**Appendix D: Photo 2).** An on-site survey determined that Region 3 however did not provide suitable habitat for mist netting due to its thin tree line and thick understory it contains **(Appendix D: Photo 4).** Region 2 was also eliminated as a mist netting site due to its thick understory (**Appendix D: Photo 5)** The southern wooded area, Region 1, contained suitable conditions due to more open understory for foraging bats and potential roosting sites in dead and dying trees. This woodlot's canopy was dominated by Black Cherry, Sugar Maple and Black Locust. The only viable wetland on the survey site was a small grass-lined 20 foot diameter pool in Region 5, the storage yard. Due to its openness it also was not suitable for mist netting.

As the site falls within the summer range of the Federally Endangered Indiana Bat, *Myotis sodalis,* USF&WS (U.S. Fish and Wildlife Services) requested that two night survey effort of mist netting of one net site be performed to assess the presence of the bat. Both Net 1-A and Net 1-B were positioned within the woodlot of Region 1 adjacent to several dead trees with exfoliating bark that could serve as roost sites for forest bats including the Indiana Bat (Myotis sodalis). **(Appendix A: Map 4)** This woodlot did not contain any defined corridors that could be used as traveling or foraging corridors. Net 1-A was placed so it could intercept bats emerging from one large and a cluster of medium sized dead Black Locust trees (**Appendix D, Photos 6 &7**). Net 1-B was placed thirty five yards east of Site 1-A adjacent to several other Black Locust trees with peeling bark and knot-holes also offering potential roost sites. (**Appendix D: Photo 8)**

The mist-net survey was performed on June 15 and 16, 2013 by Mr. Merrill Tawse (USF&WS Permit #TE38785A-0). No Indiana Bats were captured or observed during the survey

2.0 Species Description

The Indiana Bat is in the genus *Myotis* (**Appendix B: Photos 1-3**). Within the study range two similar appearing bats from this genus are encountered, the Little Brown Bat (*Myotis lucifugus*) (**Appendix B: Photo 4**), and the Northern Long Eared Bat (*Myotis septentrionalis*) (**Appendix B: Photo 5**). Size, body length, and habitat requirements are similar for these three species. Each of these three species could be encountered foraging in habitats like the proposed construction area and each could be encountered roosting under exfoliating bark or in tree

crevices. At this time accurate identification can only reliably be made by capturing and direct examination of these bats.

The Indiana Bat is distinguishable in that the Northern Long Eared Bat has a longer and more pointed tragus in its ear pinna (**Appendix B: Photo 5**) than the Indiana Bat. The Little Brown Bat has some scattered, longer toe hairs, which the Indiana lacks. The Indiana Bat has a "keeled calcar" along the trailing edge of its tail membrane (**Appendix B: Photo 2**), which the Little Brown Bat does not. The pelage color of the Indiana Bat is a dull grayish color instead of the bronze color of the other two bats (**Appendix B: Photo 1**).

3.0 Materials and Methods

The bat survey was accomplished by mist netting within the project area on two consecutive evenings. Very fine mist nets (36 mesh, 2 ply, 50 denier, 4 shelf, 12 meter long and 2.6 meter high nets from AFO Banding Supplies of Manomet MA) were set each night. Two canopy nets were erected at the survey site. The canopy nets sets consisted of two, stacked, 12 X 2.6 meter nets stretched between telescoping metal poles with pulley systems to raise and lower the nets. The net locations were positioned across potential bat corridors (flyways) adjacent to the more dominate potential roosting sites. During each of the survey nights (netting each night continued for five and one half hours the first night and five hours the second). The nets were placed at sites such that the nets completely spanned the corridor, extending into the closed canopy above and lateral borders extending into the sides of the corridor or approximating the net's length (12 m). Nets were inspected in 10 minute intervals and bats removed when encountered in mist nets (**Appendix B: Photo 6**).

Bats captured during a Mist-net surveys are identified to species, sexed, aged, weighed, assessed for reproductive activity, banded (**Appendix B: Photo 10**), and then released at capture location. Although young of the year were not yet expected to be flighted at the time of this survey aging is accomplished by shaped of phalange bone joints of the wing. Adults have a "knobby" joint (**Appendix B: Photo 8**), and juveniles have a more tapered (**Appendix B: Photo 8**) joint. Adult females were examined to determine if they were pregnant or lactating (nursing young) (**Appendix B: Photo 9**).

Nets were spread each evening at sunset (9:00pm) and lowered after over five hours of netting. Nets were checked every 10 minutes for the presence of captured bats. To minimize the potential transmission of white-nosed syndrome (WNS) paper "lunch" bags were available for use as sterile holding bags were used to hold and weigh the bats in and were disposed of after a single use. Gloves were wiped between handling of bats according to USF&WS protocol, measuring equipment was disinfected between each bat and netting equipment was also disinfected after the survey nights. Equipment on hand in anticipation of captured Indiana Bats included ODNR aluminum wing bands and LB-2 radio transmitters from Holohil. At the end of the survey all materials-nets and poles-were removed from the site.

4.0 Results

On the first night of netting, June 15th, the temperature at the opening of the mist nets at 8:50PM was 76°F under partly cloudy skies. The ½ moon set at 1:15AM and nets were closed at 2:15AM with a temperature of 61°F. A light breeze was in the open areas but did not cause any net movement within the forest canopy. **(Table 1)** No bats were captured, and no bats were heard acoustically during the survey night. No bats were observed in the open areas of the site as well.

On the second night of sampling, June16th; the temperature at the opening at 9:00PM was 73° F, under high cumulus clouds. By the closing of the nets at 2:00AM the temperature was down to 63°F and a high cloud ceiling. There was no wind during the sampling period. No bats were captured **(Table 2).** One bat was observed flying out over Region 4 at 9:15PM.

No Indiana Bats (*Myotis sodalis*) were captured during this survey

5.0 Discussion

On June 15th the conditions throughout the five hours of required netting fully complied with USFWS specifications; the weather remained with partially over cast clear skies, high humidity, no precipitation and only light winds. The almost 1/2 moon did not cast light on either of the mist nets during the survey period due to the tree canopy. Acoustic monitoring did not indicate any bats foraging or passing through the survey area.

During the second night of the survey, June 16, 2013, the nets were opened at the observed sunset time of 9:00pm. Weather conditions remained partly cloudy to clear, no precipitation, and no wind occurred during the survey period. All weather conditions and time intervals were in compliance with USFWS standards.

During the survey no bats in the genus *Myotis*, which includes the Federally Endangered Indiana Bat (*Myotis* sodalis) were observed or captured.

TABLE 1: Activity **Observed and Recorded June 15, 2013**

Time	Net Site	Captures	Observation
8:50pm	Net 1-A and Net 1-B	0	Nets Opened
1:45am	1-A	0	
2:00am			Nets closed

TABLE 2: Activity Observed and Recorded June 16, 2013

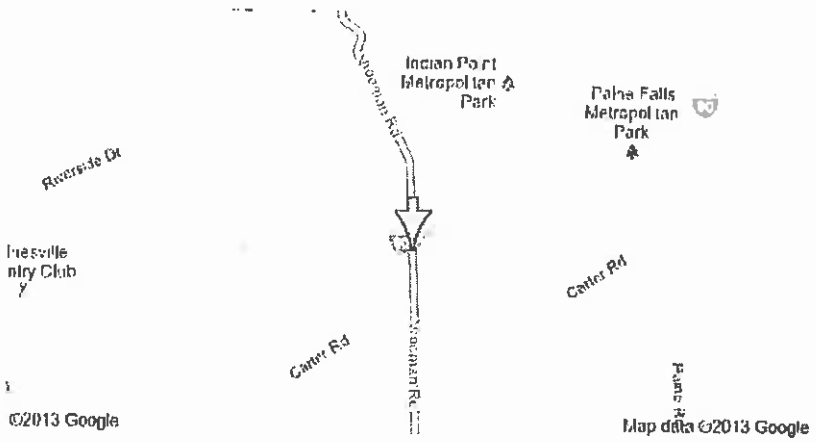
Time	Net Site	Captures	Observation
9:00pm	All	0	Nets opened
9:15pm	Open are northeast of Nets		Bat flying to NE high above treetops
2:15am	All	0	Nets closed

TABLE 3: GPS locations at nets

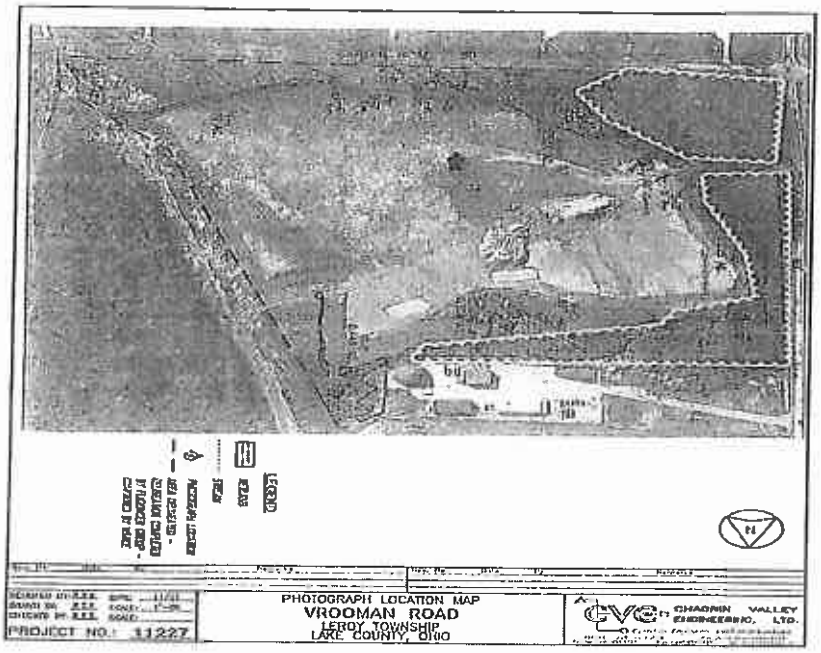
Net Site	Latitude	Longitude
1-A	N 41° 70.281'	W 081° 17.548'
1-B	N 41° 70.368'	W 081° 17.512'

Appendix A: Maps

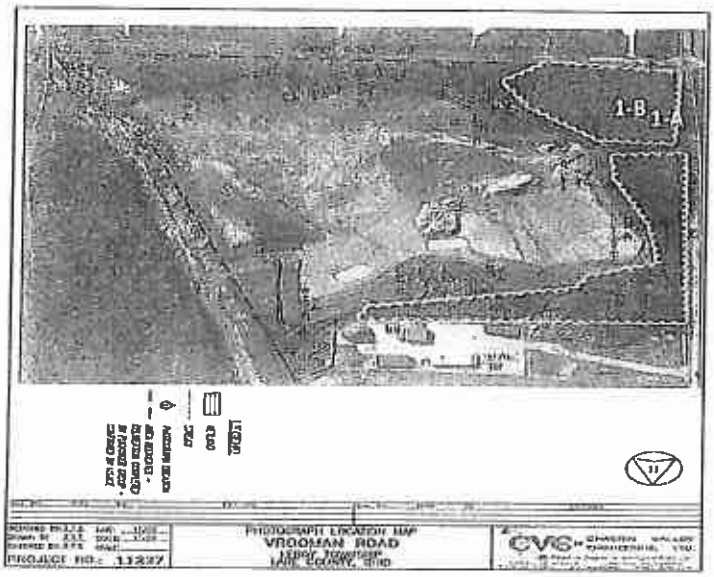
Map 1: Location of Lake County, Ohio



Map 2: Location of the ODOT Vrooman Road Survey Site SE of the intersection of I-90 and Vrooman Road.



Map 3: Arial map of the Vrooman Road ODOT Facility with red outlining areas of woody vegetation.



Map 4: Arial map of the Vrooman Road ODOT Facility with net sites marked.

Appendix B: Bat Species Photographs

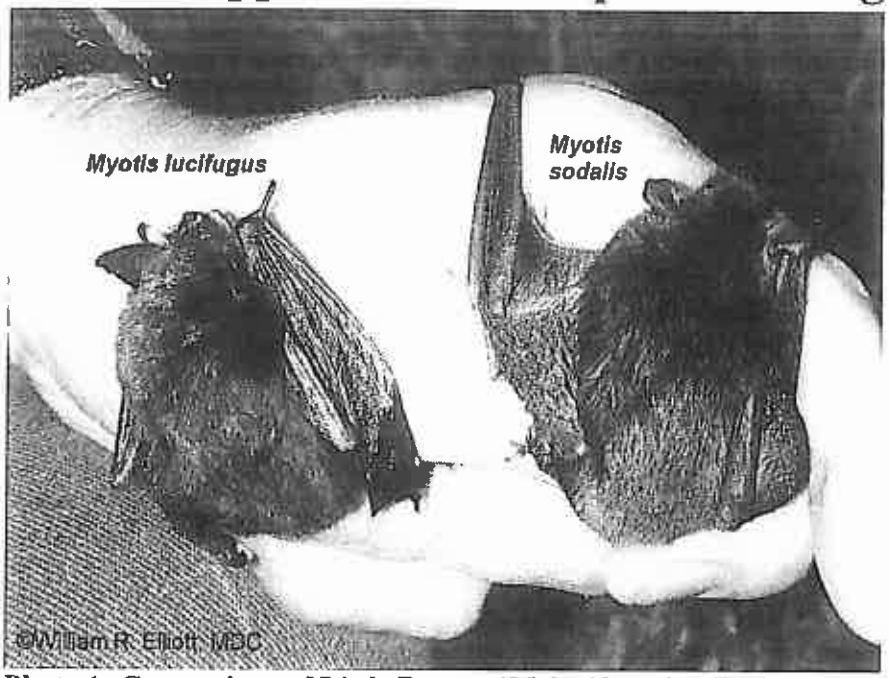


Photo 1: Comparison of Little Brown (*M. lucifugus*) to Indiana Bat (*M. sodalis*).

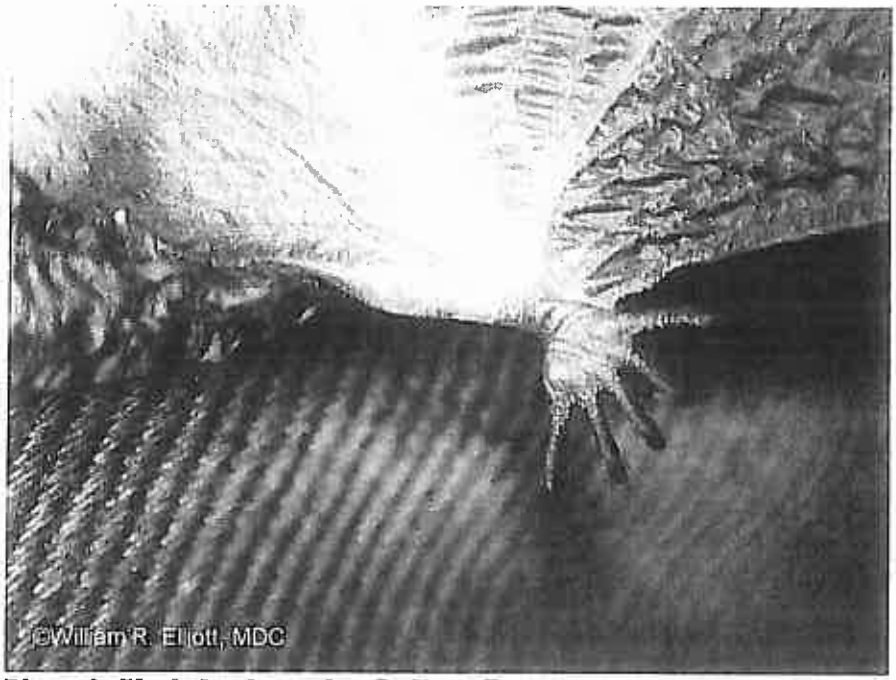


Photo 2: Keeled calcar of an Indiana Bat.

Photo 3: Indiana Bat showing pink lips

Photo 4: Little Brown Bat showing dark lips and short ear tragus.

Photo 5: Northern Long-eared bat showing long ear tragus

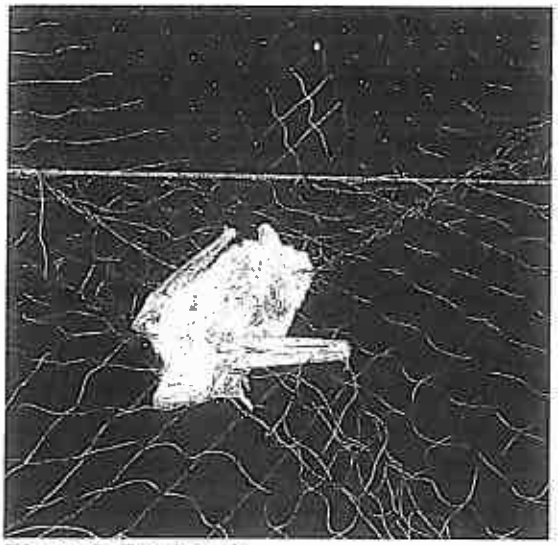


Photo 6: Bat in mist net.

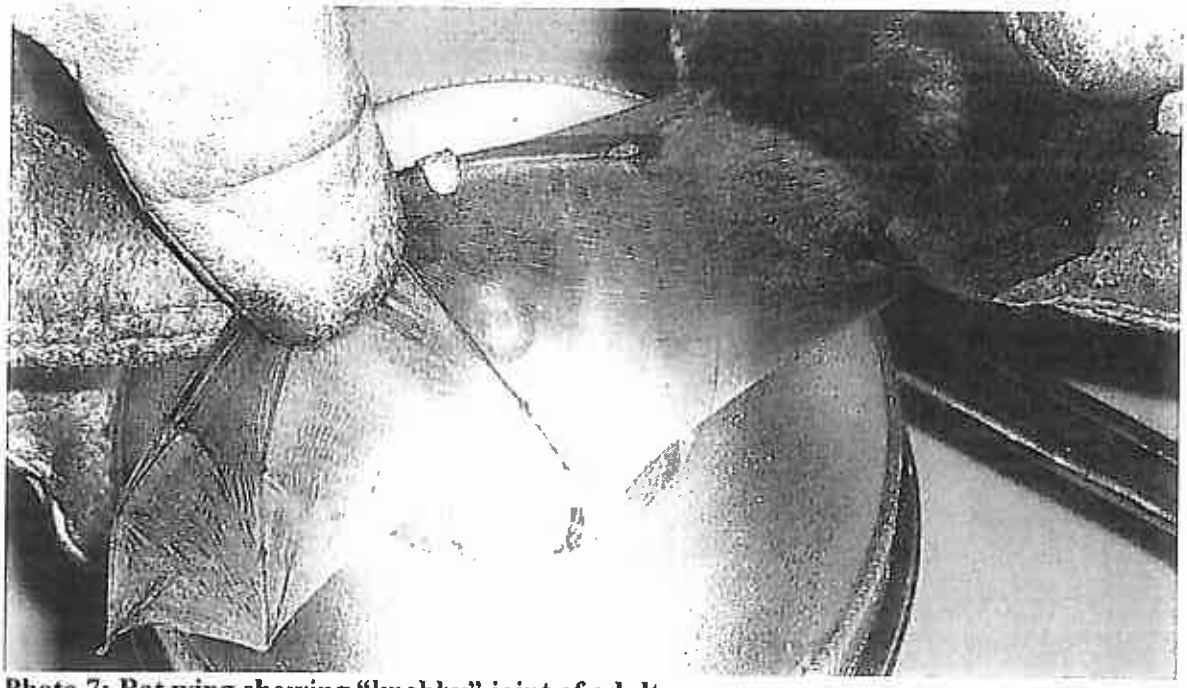


Photo 7: Bat wing showing "knobby" joint of adult.

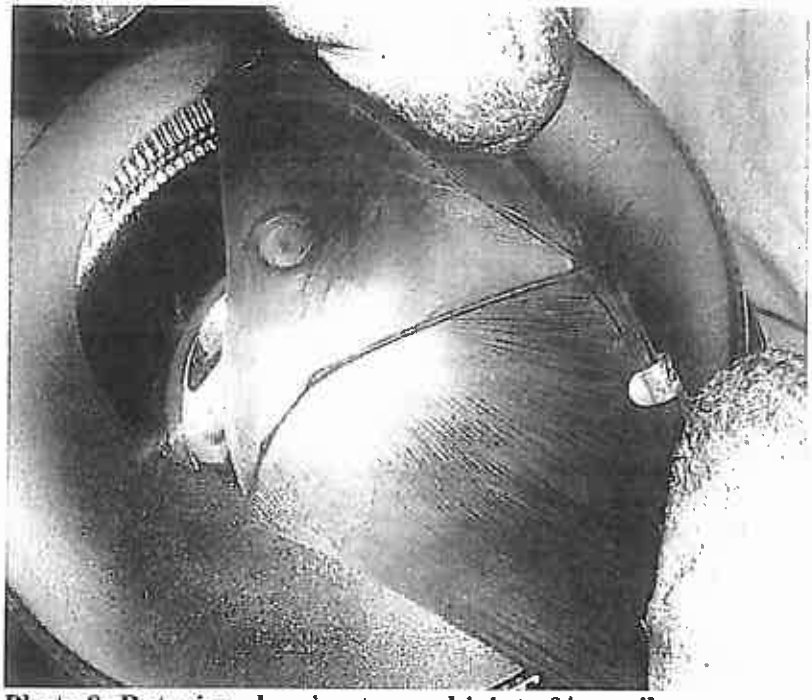
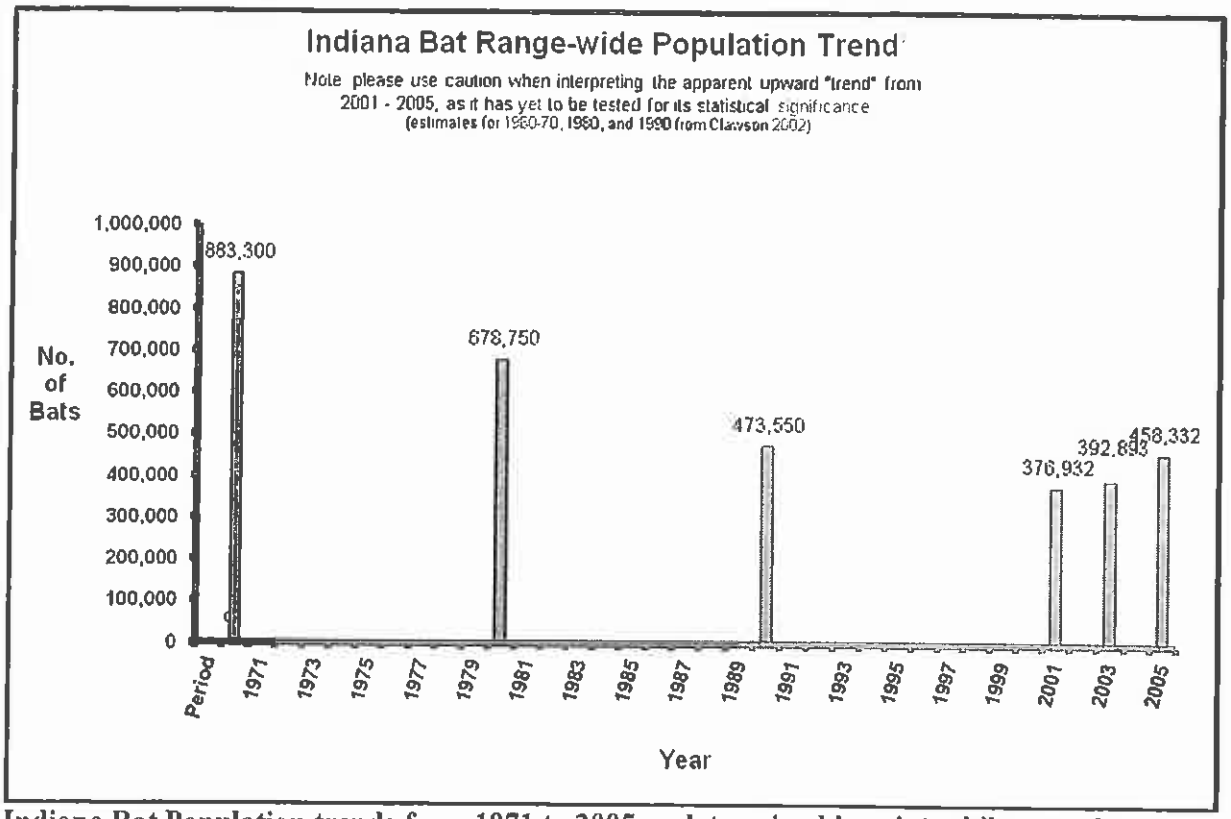


Photo 8: Bat wing showing tapered joint of juvenile.

Photo 9: A bat showing evidence of lactating.

Photo 10: Big Brown Bat with wing band.

Appendix C: Indiana Bat Population Trend



Indiana Bat Population trends from 1971 to 2005 as determined by winter hibernacula surveys

Appendix D: Net Site Photographs

Photo 1: Site photo with numbered regions.

Photo 2: Photo showing entry to survey site off Vrooman Road. (between Regions 1 + 2)

Photo 3: View of storage yard looking west through woody/shrubby growth skirting Vrooman Road. (Region 2)

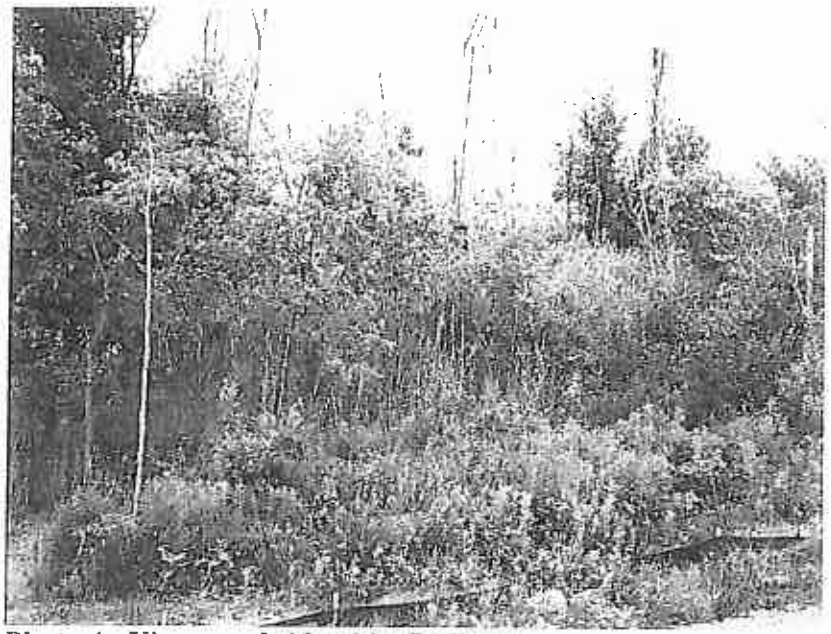


Photo 4: View woody/shrubby Region 3, north of storage yard.

Photo 5: View of thick understory in Region 2 woods.

Photo 6: Dead Black Locust adjacent to mist net at Site 1-A in Region 1.

Photo 7: Cluster of dead Black Locust at Site 1-A. (Region 1)

Photo 8: Dead Black Locust adjacent to mist net at Site 1-B in Region 1.