



# The Antediluvian

## Ohio's Floodplain Management Newsletter



{an · te · dā · lōō · vē · ən: **Before the Flood**}

Volume XIX, Issue 2

*Ensuring the wise management of Ohio's floodplains*

Fall 2013

### **Floodplain Development by a State Agency**

*By Christopher M. Thoms, CFM Program Manager, Floodplain Management Program*



The 749 Ohio communities that currently participate in the National Flood Insurance Program (NFIP) should be very familiar with this citation from the Ohio Revised Code (ORC) that establishes the standards of the NFIP as the *minimum* flood risk reduction threshold for all our political subdivisions [see also Ohio Administrative Code (OAC) §1501:22-1-04]. Sometimes overlooked is that State Agencies are also required to comply with these minimum flood safety standards. Beyond the obvious State Departments and Offices, state agencies may include universities, colleges, and park districts that have exclusive legal jurisdiction for their property.

Since state agency-involved floodplain development is not unique to any community

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**Keep Your  
Community's  
Information  
Current!**

Please assist the Floodplain Management Program in keeping our records current by submitting new contact information or addresses to Tina Ray at 614-265-6750.

or region of Ohio, we offer a new fact sheet, **Floodplain Development by a State Agency**, in hope that it will benefit both local and State Agency Floodplain Administrators (FPAs) across the state, by clarifying what the review process should be, including the appropriate legal authorities [view at: <http://www.dnr.state.oh.us/water/tabid/3519/Default.aspx>].

***ORC §1521.13 Floodplain management activities.***

*(A) Development in one-hundred-year floodplain areas shall be protected to at least the one-hundred-year flood level, and flood water conveyance shall be maintained, at a minimum, in accordance with standards established under the national flood insurance program. This division does not preclude a **state agency** or political subdivision from establishing flood protection standards that are more restrictive than this division. (emphases added)*

Special Flood Hazard Area (SFHA)-development that is state agency *financed* or *funded* within a local jurisdiction but not directly *undertaken* or *preempted* by the agency, would be subject to the permitting process of the local jurisdiction(s).

***ORC §1521.13(D)***

*(1) Development that is **funded, financed, undertaken, or preempted by state agencies** shall comply with division (A) of this section and with rules adopted under division (C) (9) of this section.*

*(2) **State agencies** shall apply floodproofing measures in order to reduce potential additional flood damage of existing publicly owned facilities that have suffered flood damage.*

*(3) Before awarding funding or financing or granting a license, permit, or other authorization for a development that is or is to be located within a one-hundred-year floodplain, a **state agency** shall require the applicant to demonstrate to the satisfaction of the **agency** that the development will comply with division (A) of this section, rules adopted under division (C)(9) of this section, and any applicable local floodplain management resolution or ordinance.*

*(emphases added)*

In contrast, all state agency-*undertaken* or *preempted* SFHA-development is not required to obtain a local permit, but nonetheless, must meet or exceed all federal, state, and local flood risk reduction standards. Although a local FPA's review of, and commenting upon, such *undertaken* or *preempted* SFHA-development greatly improves the likelihood of ensuring compliant flood risk reduction, the actions of a state agency are the responsibility of that agency much as development within a village, city, or county are theirs, respectively. In like manner, such development by state agencies require compliance with the same flood risk reduction standards, but not local permits.

Both the community and state agency benefit when they agree to cooperate in ensuring compliance for any SFHA-development, even when *undertaken* or *preempted*. Utilizing the local FPA's familiarity with both the site and local flood risk reduction standards, the state agency need not duplicate the existing local process and can maintain good relations with their host or neighboring community. The entire process can be the same as when issuing a local permit,

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save the result is a mutually agreeable documentation of compliance rather than a permit.

In the absence of local floodplain regulations, state agencies are required to meet or exceed minimum NFIP-standards [ORC 1521.14].

Let us know if you have any questions about how flood risk reduction standards are to be applied to any SFHA-development. ODNR's Floodplain Management Program routinely assists local state and federal officials with understanding and implementing their floodplain management responsibilities. After all, it is a shared goal and responsibility to reduce flood risk, no matter whose jurisdiction.



Ohio Department of Natural Resources  
**Division of Soil & Water Resources**  
Fact Sheet

**Floodplain Management Program:  
Floodplain Development by a State Agency**

<p><b>A Shared Goal and Legal Requirement</b></p> <p>While flood risk reduction is a goal shared by everyone, not everyone realizes that, in Ohio, it is also a legal requirement [ORC 1521.13]. Because the means by which different jurisdictions attain this goal and fulfill this requirement may vary, it is understandable that there may be confusion concerning the permitting process for floodplain development by a State Agency.</p> <p>The process (and its effectiveness) may vary from agency to agency as it does from community to community.</p> <p>Federal, State, and most local flood safety regulations are based upon the performance standards established in the National Flood Insurance Program (NFIP). Simply stated, the NFIP requires that all Special Flood Hazard Area (SFHA)-development within an NFIP-participating community must meet or exceed the NFIP-standards [44CFR60.3]. Whether an SFHA-development is proposed under local or State jurisdiction may change the source of the permit, but in either case, the standards remain.</p> <ul style="list-style-type: none"> <li>• For the majority of these developments, applicants are required to submit an application for an SFHA-development permit to the community.</li> </ul>	<ul style="list-style-type: none"> <li>◦ This includes State Agency financed or funded development, undertaken by a non-agency developer [ORC 1521.13(D)].</li> <li>• SFHA-development that is directly undertaken or preempted by a State Agency is still required to comply with federal, State, and local flood safety standards but is not required to obtain a local permit (or variance). State Agencies must also ensure / demonstrate compliance with all SFHA-development it undertakes or preempts [ORC 1521.13(D)].</li> <li>• SFHA-development that is directly undertaken or preempted by a Federal Agency is required to comply with NFIP-flood safety standards but is not required to obtain a local permit (or variance) [E.O. 11988].</li> </ul> <p><b>Shared Responsibilities of Local and State Agency Floodplain Administrators</b></p> <p>Ensuring that applicants apply to the correct jurisdiction(s) is both desirable and required. Local FPAs must be aware of exceptions to their permitting authority [CFR59.22(a)2].</p> <p>ODNR's Floodplain Management Program (FMP) office can assist both local and State Agency FPAs (and applicants) with knowing which authority(s) to consult to obtain the required floodplain development permits. View <a href="http://www.dnr.state.oh.us/water/waterobs/orclaw/flood_law_main.shtm">www.dnr.state.oh.us/water/waterobs/orclaw/flood_law_main.shtm</a> to see some of the State Agency authorities.</p>
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**Variations**

Since local FPAs are more likely to be aware of their area's flood hazards and regulatory standards, the FMP encourages cooperative efforts between the local and State Agency FPAs (and with the FMP) to reduce flood risk through compliance as required by local, State, and federal law. To this end, we suggest that State Agency FPAs provide copies of their documentation for each proposed development to local FPAs and in return, those FPAs review that documentation for compliance with local standards. This is a courtesy to both and not a submission. In that light, we encourage the following sequence.

**Variations**

For those rare cases where a jurisdiction (whether local or State Agency) deems it necessary, they may review a proposed development to determine whether a variance is warranted (in accordance with compliant flood risk reduction variance criteria). Since a flood safety variance permits a development that does not meet the jurisdiction's minimum flood safety standards, these are to be avoided whenever possible. As with the rest of this permitting process, cooperative discussion is desirable. If a local FPA concludes that a State-issued variance would be improper and cannot be resolved between the two, the FMP can advise both parties [ORC 1521.14 (B)].

Suggested Contacts Between State Agency & Local Floodplain Administrators	
State Agency Officials	Local Officials
1. Confirm what agency and local flood damage reduction standards are (they can and do vary) [ORC 1521.13(D)].	1. Notify State Agency FPA (and FMP) of proposed or ongoing SFHA-development with State Agency involvement [CFR59.22(a)2].
2. Provide plans to Local FPA.	3. Review plans.
4. Discuss proposed development to determine the most effective means to accomplish compliant development.	5. Identify standards not addressed / met by proposal /construction. Suggest remedies.
5. Complete / correct / provide proposal, compliance documentation (as needed).	7. Maintain copy of documentation.
6. Provide copy of documentation of compliance to local FPA(s) [ORC 1521.13(D)3].	8. Keep record of all State or Federal Agency SFHA-development activities within your community [CFR59.22(a)7].
8. Keep a summary of all your Agency's SFHA-development activities and their locations.	Other materials, may be obtained at: The Ohio Department of Natural Resources Division of Soil & Water Resources Floodplain Management Program 2045 Morse Road, B-2 Columbus, Ohio 43229-6693 (614) 265-6750 E-mail: <a href="mailto:water@dnr.state.oh.us">water@dnr.state.oh.us</a> Website: <a href="http://ohiodnr.gov">ohiodnr.gov</a>



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**Other State Agency Floodplain Management Authorities in the ORC**

§1509.02 ODNR's Oil and Gas Drilling rules;  
 §§ 4781.04(A)(1) & .32-34 OMHC manufactured homes in floodplain;  
 §3701-28-10 & 21 ODH's Water well rules;  
 §3745-9-04 & 05 OEPA's well rules; and  
 §901:10-2-02 ODA's feed lot permitting.

(see: [www.dnr.state.oh.us/water/waterobs/orclaw/flood\\_law\\_main.shtm](http://www.dnr.state.oh.us/water/waterobs/orclaw/flood_law_main.shtm))

## **Current Events of the Ohio Floodplain Mapping Program**

*Katherine Skalak, CFM, Environmental Specialist, Floodplain Management Program*

There are many flood mapping projects that are in process around the state. This article will focus on the watershed project map updates, Lake Erie Mapping updates and what's next for the levee projects.

In 2011 and 2012, three new county wide projects and seven Physical Map Revision Projects were funded. These counties include: Washington, Meigs, Summit, Athens, Erie, Lawrence, Shelby and Licking Counties. Most of those projects have either been released or will be released as preliminary maps very soon. The most common update the counties are receiving is a model-backed approximate Zone A update. The engineering models do not take structures into consideration, and have no field survey work associated with them. All counties except Athens have updated Zone A's as part of their scope. The main reason that Summit County was updated is that there were many leverage United States Geological Service (USGS) studies to incorporate. These USGS studies are to update many of the detailed studies (Zone AE) throughout the county. All of communities with the exception of Licking County have gone preliminary and have had their open house. Licking County will be going preliminary in August so the Open house will likely be sometime in October. Logan County is also in the map production phase; however it will not go preliminary until next summer. For more information about the Risk Map Meetings, please refer to Melissa Menerey's article entitled "What's with all these meetings?!: A Crash Course in Risk MAP Meetings" (page 5).

In summer 2012, Discovery occurred for all of the Lake Erie Counties in Ohio. Additionally these counties also had technical workshops explaining what the study was all about. Now, five counties, Lucas, Ottawa, Sandusky, Erie, Lorain and Cuyahoga, are in process of having their shoreline Flood maps updated with information from the study. These updates are anticipated to only affect about 2 miles inland, in most areas. In some counties this distance will be greater. Also in some areas, this could mean the addition of V Zones to the flood maps; however, it will not be known if there will be V Zones along Lake Erie until after the study is further along.

The final type of mapping update that is occurring now is a result of the new levee guidance that was just released. There are currently about ten projects that were put on hold as a result of the impending levee guidance. In the next year or so, communities may begin to see these projects move forward. FEMA will be starting with a pilot project for each state. In Ohio, the first levee project to utilize the new levee guidance will be the Chillicothe levee in Ross County. It has not been determined which levee project will be second.

For further information about Ohio's Floodplain Mapping Program, or to get dates on specific

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projects, please refer to the map located on the Ohio Department of Natural Resources’ Floodplain Management program website (<http://www.dnr.state.oh.us/water/tabid/3524/Default.aspx> ).



## What’s With All These Meetings?!: A Crash Course in Risk MAP Meetings

*Melissa Menerey, Environmental Specialist, Floodplain Management Program*

As I’m sure many of you are aware, we are moving forward with the newest installment of FEMA floodplain mapping projects which is called Risk MAP (mapping, assessment, and planning). With the new name and changes, this results in a few more meetings, and leaves many people (including myself) asking “*what IS with all these meetings?*” The idea behind the meetings is participation – FEMA wants to engage local officials to in conversation to improve the

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## The Quick Guide to Meetings

*Discovery- “Meet ‘n Greet” to discuss flood risk and mapping process.*

*Flood Risk Review Meeting- A chance to “touch base” part way through the project to discuss risk.*

*Consultation Coordination Officer Meeting / Open House- “two meetings for the price of one” to chat about preliminary map*

*Resilience Meeting- Now that we have ID’d the risk let’s talk about mitigation*



mapping of risk and mitigating identified risks. The four meetings of Risk MAP include: *Discovery*, *Flood Risk Review Meeting*, *Consultation Coordination Officer Meeting / Open House*, and a *Resilience Meeting*.

You might be familiar with the Map Modernization terminology of a *Scoping Meeting*, which was a meeting to gather stakeholders at the start of a mapping project to inform communities, educate local officials on the mapping process, gather data, and identify needs within the community. The *Scoping Meeting* has morphed into a *Discovery Meeting*. In FEMA’s words this meeting is to “engage watershed stakeholders, understands the needs of communities in a watershed, introduce or enhance flood risk discussion, and balance FEMA’s Resources with a plan for a possible Risk MAP project” (FEMA Operating Guidance No 04-11, pg 6). This meeting gets the ball rolling in terms of community data- Is there an approved Local Hazard Mitigation Plan? Does the community have Inventory of culverts/bridges? Are there any repetitively flooded neighborhoods/roads? This meeting starts the dialog for the mapping project and can identify priorities for the communities and within the watershed. You can think of this meeting as a meet and greet with an emphasis on discussing flood risk. When your community enters this stage, please come ready to discuss local mitigation issues. After this meeting, a report is produced called (fittingly) a *Discovery Report*, which can be found for the state of Ohio on ODNR’s Webpage at: <http://www.dnr.state.oh.us/water/tabid/3524/Default.aspx>.

Up next in the long march of new meetings is the *Flood Risk Review Meeting*, which occurs at the end of the Data Development and Sharing phase (see timeline located below). This is typically between the *Discovery Meeting* and the *Consolation Coordination Officer Meeting/Open House*. While this meeting is optional, FEMA *strongly* encourages its partners to

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hold this meeting. At this meeting technical information is presented and FEMA suggests showing only the non-regulatory information (such as depth grids) to steer the conversation of the meeting toward risk mitigation. The content of this meeting is typically more technical and local floodplain managers, GIS coordinators, engineers, and other officials who want to know more about the “nuts and bolts” of the floodplain mapping process are encouraged to come.

When a community’s Preliminary *Flood Insurance Rate Maps* are released a *Consultation Coordination Officer Meeting/ Open House Meeting* is held. In Ohio this meeting usually takes place before the *Resilience Meeting*. The *Consultation Coordination Officer Meeting/ Open House Meeting* can be thought of as “two meetings for the price of one.” Usually the first part of the meeting is scheduled during business hours and local officials are encouraged to attend to listen to a formal presentation and ask questions to the mapping contractors, ODNR, and FEMA. While that meeting is open for any interested party, the presentation and conversation is geared toward local officials who must regulate the floodplain and those that have decision making capabilities within the community. The next portion of the meeting is held in the evening. This is the *Open House* component of the meeting. The *Open House* is a less formal meeting where the public is encouraged to come and look at the preliminary maps to see how the proposed maps may have an impact on their property. When parcel layers are available from the county ODNR sends out postcard notification to property owners who have experienced a change in floodplain on their property with the new maps. This is to raise awareness for flood risk and to foster participation in the open house component of the meeting. Staff from ODNR is available to help the public navigate the new maps and field questions; local officials are encouraged to stay for the *Open House* to meet with property owners they may be working with in the future.

After the *Coordination Office Meeting/ Open House* an announcement will be made in the Federal Register and local newspapers about the official comment and appeals period for the purposed maps. This appeals period lasts for 90 days after the posting in the Federal Register. Typically, from the time of the *CCO/Open House* to the purposed maps becoming effective is approximately 14 to 16 months depending on the number of comments and appeals to the maps. The *Consolation Coordination Officer Meeting/ Open House* is a “heads up” meeting to talk about the purposed maps, solicit comments and appeals before the new map becomes law, and chat about flood risk.

The *Resilience Meeting* is the usually the last meeting scheduled in the new Risk MAP series in the State of Ohio. Typically this meeting is a few months before the preliminary maps become effective. The same participates that were invited to the *Discovery Meeting* will also be invited to the *Resilience Meeting* as well as any other people the community feels should be included. The agenda of this meeting includes a brief presentation recapping the previous meetings and some discussion about previous mitigation projects within the community. The coor-

dinators of the meeting will look for a local individual who has played a key role in successful mitigation projects. Those *local champions* will be asked to speak about those mitigation projects including challenges and successes during the brief presentation. Other components of the presentation will include: understanding flood risk, strategies to reduce flood risk, resources to facilitate implementation, and communication roles and responsibilities. The largest part of this meeting is a breakout group session. Participants will divide into smaller groups to discuss areas that would benefit from mitigation, talk about uses for non regulatory products, and brainstorm how to implement mitigation and incorporate those ideas into the local hazard mitigation plan. Each group will have a copy of a community map to write notes about potential mitigation activities. After the meeting a report will be written and distributed to help further the conversation of mitigation activity.

Below is a timeline of the meetings of Map Modernization and Risk MAP to help compare the number and timing of the meetings. The Risk MAP process is a longer more involved process that aims to accurately assess flood risk, increase public awareness of risk, and encourage action to lower risk to lives and property.

(See image on opposite page)

### **Substantial Damage Determinations:**

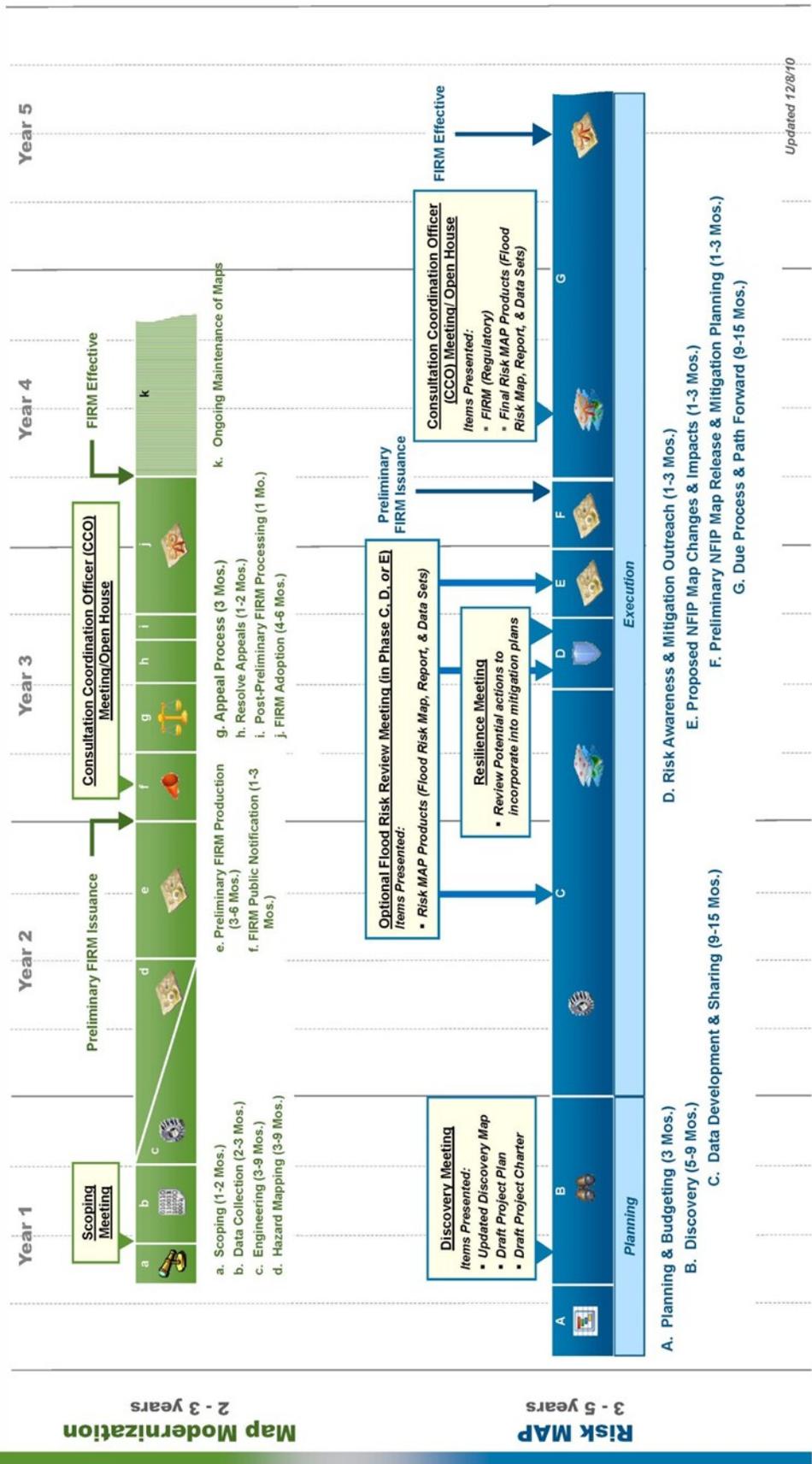
*Jarrod Hittle, CFM, Environmental Specialist, Floodplain Management Program*

When I first took a job as a local floodplain administrator, I did what any new employee would do..... I read the manual (FEMA 480), attended workshops, and read all the reference material I could find; trying to figure out exactly what floodplain management was. Needless to say, I was still a little green when a small village in my jurisdiction had a significant flood event that affected about half of the town. Once the waters receded, I hopped in the car and toured the flooded areas to view the damage. When I returned to the office, I received a call from ODNR Floodplain Management Program asking about the extent of the damage and if I needed assistance conducting substantial damage (SD) determinations....Huh?! After a crash course in conducting SD determinations, I dutifully performed the substantial damage determinations throughout the village, meeting many persevering people. One person even came to the door with a 10" knife in hand to greet her new local official.....Welcome to floodplain management.

As I sit here writing this article, it has rained almost every day for two weeks and there are flash flood advisories for most of Central Ohio and the Miami Valley. This article will serve as a timely reminder of the local floodplain administrator's responsibility to conduct sub-

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# Map Modernization and Risk MAP Project Timelines



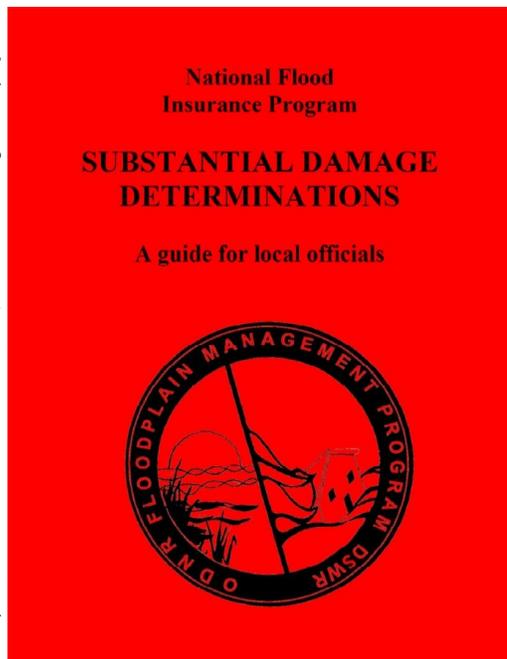
stantial damage determinations. A common misconception is that SD determinations are only conducted in the event of a flood; the local administrator is required to conduct SD determinations on any structure located in the special flood hazard area that sustains damage of any kind regardless of the source (*i.e. wind, fire, tornado, etc.*).

Some of you might be asking where do I start? First, start with ODNR's website [http://www.dnr.state.oh.us/water/floodpln/S\\_Damage\\_06/tabid/3521/Default.aspx](http://www.dnr.state.oh.us/water/floodpln/S_Damage_06/tabid/3521/Default.aspx) there you will find the *NFIP Substantial Damage Determinations: A Guide for Local Officials*. It explains how to conduct SD inspections, determining damage cost, determining pre-flood market value, and making the SD determination. It also includes templates the local official can use to communicate the SD requirements to residents. On page 14 you will find the *Depth Damage Field Estimate*. This form is used by the local official when determining percent damaged to a building. Using this Depth-Damage method, the inspector measures a structure's exterior flood mark to lowest adjacent grade and indicates the

measurement on the form's depth column. A table of damage percentages, specific to structure-type, is contained on the form. The table is based upon the U.S. Army Corps of Engineers' Generic Depth-Damage Relationships for this region of the country.

That damage-percent may be used by the local official to inform the property owner that their structure has been substantially damaged (50% of the pre-damaged market value) and must therefore be repaired in such a way as to be in compliance with the community's flood safety standards for new construction. A sample letter for use in notifying the property owner of that substantial damage determination can be found in the newly revised *NFIP Substantial Damage Determinations: A guide for local officials*. As with any substantial damage determination process, the property owner may provide additional information to the local official to better define the pre-damage event market value, extent of damage, and cost of repair. The local floodplain official's determination should be based upon the best information available.

Unless you request assistance conducting SD determinations you will typically be doing it alone. To minimize the number of stops you have to make, I would suggest working with your County EMA office. County EMA will be there assessing the damage long before you may be able to get into an area to conduct your SD determinations. EMA compiles information such as address, depth of flooding, and comments on severity based on their observations. The local floodplain official can use this information to identify the structures and streets affected



most by the flood and focus your attention on these areas. This information was vital for me as I started my determinations. I was able to pull out the structures identified by EMA that had 1ft. or more of water in them. I entered them into a GIS database and took the GIS maps with me to the field, instead of the large flood maps, and was confident that I assessed the homes that were affected most.

With a few dry days forecasted I hope it will provide some relief to those that have experienced flooding, and to the dedicated floodplain officials across the state I would encourage you to use the resources at your disposal and draw on the experience of others when conducting SD determinations; it will make a difficult job that much easier.



## **Severe Weather Awareness Update**

*Melissa Menerey, Environmental Specialist, ODNR Floodplain Management*

The Ohio Committee for Severe Weather Awareness held their annual poster contest ceremony on Saturday, August 3, 2013 at the Ohio State Fair. Nina Wolf, a sixth grade student in Summit County during the 2012-2013 school year, was recognized as the overall winner in the statewide poster contest. Nina's colorful poster on heat waves, artistically illustrates safety tips for extreme heat. Her poster states, *Heat Waves are NOT for riding.*

The Ohio Committee for Severe Weather Awareness chose Nina's poster as the most informative, accurate and creative out of the many posters received during its annual Severe Weather Awareness Poster Contest.

As the overall state winner, Nina received a variety of awards and prizes from the committee and its partners including: a check to go toward a \$100 U.S. Treasury Direct savings bond, a letter of congratulations from Governor John R. Kasich, a NOAA Weather Radio, a smoke detector, a personalized trophy, a Community Emergency Response Team (CERT) backpack and disaster supply kit, and a host of other prizes. Later in the fall, her school will receive an engraved "traveling" trophy to showcase for the remainder of the school year. In an effort to promote severe weather preparedness, the committee will feature Nina's poster throughout the year.

This year, a total of 47 students from 25 Ohio counties were honored as regional winners. The students represented grades 1-6 from 32 schools. As regional winners, every student artist received a certificate from the National Weather Service and a sling backpack full of prizes from the offices and their partners that make up the Ohio Committee for Severe Weather Awareness.

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State Winner: Nina Wolf, 6th Grade, Summit County.

(See more posters on page 23)

Since 1978, the Ohio Committee for Severe Weather Awareness has conducted its annual poster contest. Beginning with its inception and continuing since, students have designed informative posters on severe weather safety and preparedness. The efforts of these students have helped the committee meet its overall goal – to educate Ohioans about the actions they can take to protect themselves and others before, during and after severe weather occurs. Check the OCSWA website for more information on the poster competition and severe weather safety information: <http://www.weathersafety.ohio.gov/>.

## **Damage Potential for Non-compliant Structures in the Floodway**

*Randy Keitz, P.E., Water Resources Engineer, Floodplain Management Program*

Recently, I was asked to evaluate the damage potential from the base flood (*i.e.*, 1%-annual chance flood) for several non-compliant accessory structures (*e.g.*, detached garage) located within the floodway of a larger river. (Shown in Figure 1.) I began my evaluation with the upstream-most structure, by calculating the force of water (*i.e.*, drag force) that would impact the upstream side of the structure during the 1%-annual chance flood. The equation used to calculate the drag force on a structure is:

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$$F_D = \frac{1}{2}C_D r A V^2$$

Where:  $F_D$  = Drag Force, in pounds (lbs),

$C_D$  = Drag force coefficient, which is based on the structures shape and has no units,

$r$  = Density of water at 60 degrees F, which is 1.939 slugs per cubic foot ( $\text{ft}^3$ ),

$A$  = Area of structure exposed to water perpendicular to the direction of flow, in square feet ( $\text{ft}^2$ ),  $V$  = Velocity of water, in feet per second (ft/s), and

1 slug = 1  $\text{lb}\cdot\text{s}^2/\text{ft}$

The *Flood Insurance Rate Map (FIRM)*, *Flood Insurance Study (FIS)*, a recent aerial photo, and a 2-foot contour map were used to make an estimate of the area of the structure exposed to the flow of water and its velocity during the base flood. The floodway data in Table 11 of the FIS states that cross-section P, which is shown in Figure 1, has a 1%-annual chance flood elevation of 875.8 ft (NAVD) with an associated mean or average floodway velocity ( $V$ ) of 6.0 ft/s. The 2-foot contour map indicates that the ground elevation at the location of the upstream-most structure is approximately 868.0 ft (NAVD). Thus, the flow depth at this structure's location during the 1%-annual chance flood is approximately 7.8 ft (*i.e.*, 875.8 ft minus 868.0 ft). Using the aerial photo, which is to scale, the width of the structure perpendicular to the direction of flow is 24 ft; thus, the area of the structure exposed to water is 187.2  $\text{ft}^2$  (*i.e.*, 24 ft x 7.8 ft). The drag force coefficient for structures with a structure width ( $W$ ) to depth of flow ( $D$ ) ratio less than 12 has a value of 1.25. In this case the value of  $W$  to  $D$  ratio equals 3.1 (*i.e.*, 24 ft divided by 7.8 ft).

Given that all the variables have been determined, the drag force is calculated below and has a value of 8167 pounds, which is a little over a 4-ton force. This seems like a big number relative to this light-frame accessory structure, but I have no way to directly evaluate the structural strength of the accessory structure (*i.e.*, I have no on-site access to the building). Thus, I need an indirect method to evaluate how this building will withstand the force of the water from the base flood.

$$F_D = \frac{1}{2} (1.25) (1.939 \frac{\text{lb}\cdot\text{s}^2}{\text{ft}^4}) (187.2 \text{ ft}^2) (6.0 \frac{\text{ft}}{\text{s}})^2 = 8167 \text{ lbs}$$

In many cases, damage potential is considered using the product of velocity ( $V$ ) and depth ( $D$ ), which are two variables contained within the drag force equation. A library and internet search for velocity-depth flood damage potential to structures led me to several journal

articles with most coming from international sources (*e.g.*, *Australia and Germany*). One U.S. article was located, but this paper had a focus on downstream hazards resulting from dam-breaks (*i.e.*, *ACER11*).

Combining the velocity-depth threshold relationships found in these multiple papers into one graph (Figure 2), creates a rather useful tool to evaluate structure flood damage potential. The product of velocity times depth ( $V \times D$ ) equal to  $10.75 \text{ ft}^2/\text{s}$  is a threshold value that indicates damage to light-frame structures with possible structural failure (*e.g.*, *detached garages and houses*). The product of  $V \times D$  equal to  $16.1 \text{ ft}^2/\text{s}$  is a threshold value that indicates significant damage to structures (*i.e.*, *heavy damage, which means structural damage to a load bearing wall*). In both of these cases, a velocity equal to or greater than 6.6 ft/s or a depth of flow equal to or greater than 6.6 ft also indicates damage to light-frame structures with possible structural failure and heavy damage. The product of  $V \times D$  equal to  $26.9 \text{ ft}^2/\text{s}$  is a threshold value that indicates extreme life risk and a majority of buildings could fail. Additionally, velocity equal to or greater than 8.2 ft/s or a depth of flow equal to or greater than 8.2 ft also indicates extreme life risk and a majority of buildings could fail.

Using this set of threshold velocity-depth relationships, I considered a range of potential velocity and depths for the upstream-most structure (see Table 1). For example, the average floodway velocity on the floodplain might be slightly less (*e.g.*, 4.0 ft/s) than the overall floodway average velocity of 6.0 ft/s, and the depth of flow at the structure might be slightly less (*e.g.*, 6.0 ft).

TABLE 1		
Upstream-most Accessory Structure		
Velocity (V), ft/s	Depth (D), ft	V x D, ft <sup>2</sup> /s
4.0	6.0	24.0
4.0	7.8	31.2
6.0	6.0	36.0
6.0	7.8	46.8

Plotting this range of potential  $V \times D$  conditions on the threshold velocity-depth relationship graph as shown in Figure 2 indicates that this upstream-most accessory structure will be wiped-out by the base flood, because the range of potential conditions for the accessory structures plot to the right of the  $V \times D$  curve equal to  $26.9 \text{ ft}^2/\text{s}$  (*i.e.*, *majority of buildings could fail*). Indeed a 4-ton force imposed on a light-frame accessory structure is a very big force. Similarly, the other two accessory structures immediately downstream would be expected to be severely damaged or destroyed by the base flood. Further, I would suspect that the owner of these non-compliant accessory structures would be liable for any downstream damages that might occur from the resultant debris floating downstream, that is, assuming it could be shown

*Continued on page 15*

that debris from these destroyed structures resulted in the downstream damage.

This graph of threshold velocity-depth relationships provides a good indication of the potential risks to structures located in the floodway, and provides a clear reason why floodplain regulations require that development result in no-rise of the base flood within the designated floodway. These threshold relationships are not definitive answers, but provide well-supported guidance based on real world data.

FEMA, *Engineering Principles and Practices Manual*, P-259, Third Edition, January 2012, p. 4-17.

U.S. Department of the Interior, Bureau of Reclamation, *Downstream Hazard Classification Guidelines*, ACER Technical Memorandum No. 11, Denver, Colorado, 1988.

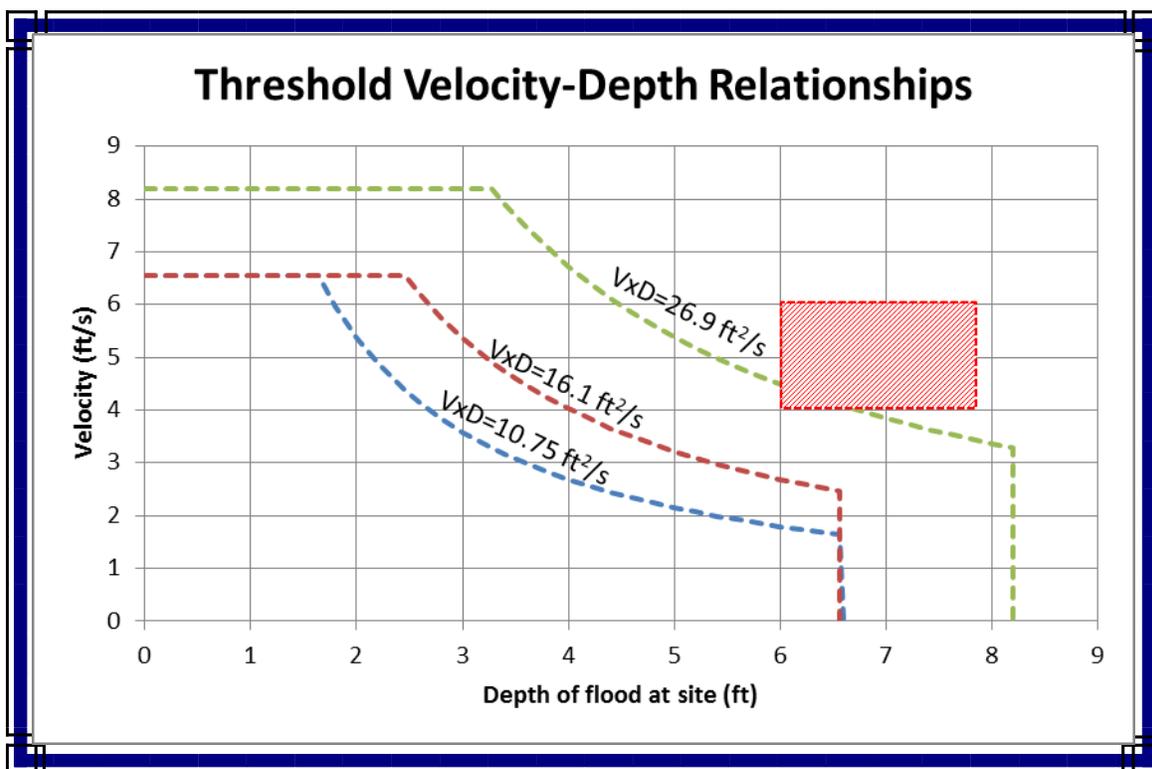
Queensland Government, Natural Resources and Mines, *Guidance on the Assessment of Tangible Flood Damages*, September 2002, p. 9.

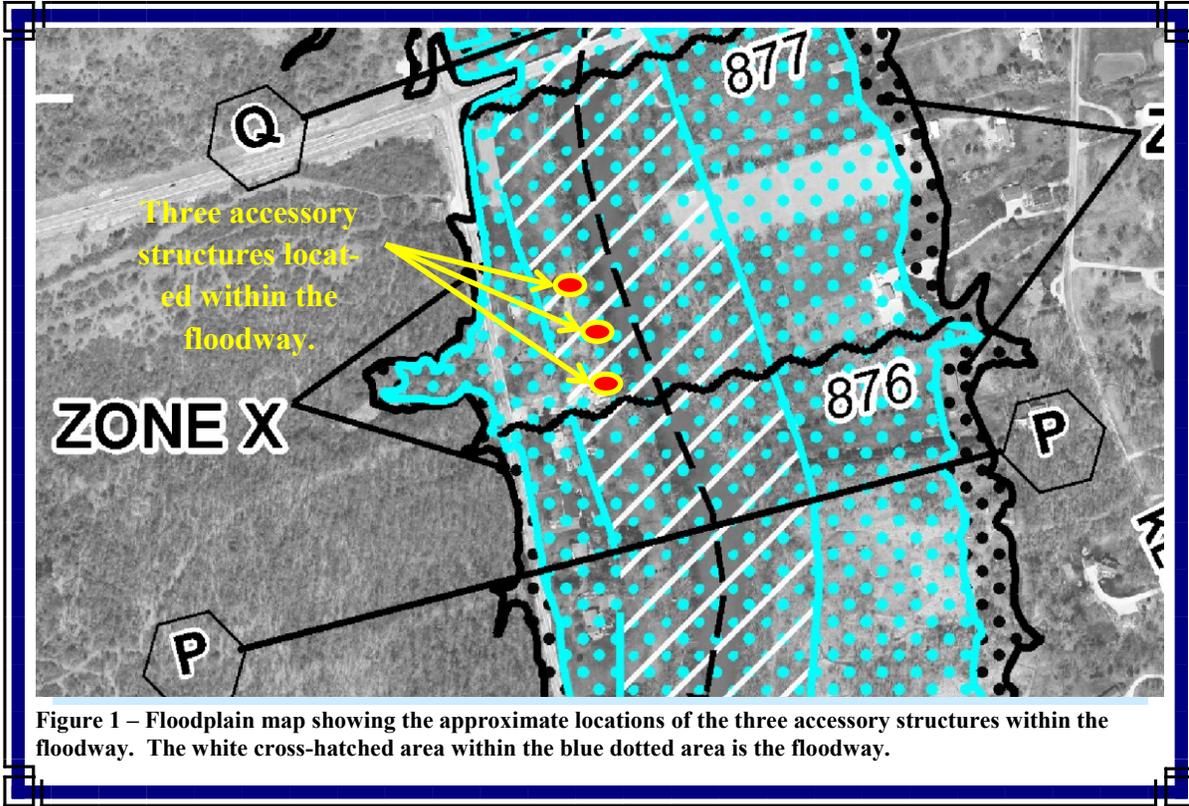
Molino S., Roso S., and Hadzilacos G., (2012) *How Much Risk Should We Take? Developing a Framework for Holistic Risk Based Floodplain Planning*, NSW FMA Annual Conference, p. 4.

Kreibich, H., et al., (2009) *Is Flow Velocity a Significant Parameter in Flood Damage Modeling?*, Natural Hazards Earth System Sciences, 9, pp. 1679-1692.

Molino, op. cit., p. 4.

(See graph below, and image on page 16)





**New GIS Updates to the MSC (<https://msc.fema.gov>)**

*Tim Beck, CFM, GIS Management Specialist, Floodplain Management Program*

The FEMA Map Service Center (MSC) recently performed updates to the site. The MSC has been working to better provide the new digital products that have been produced during Map Modernization and Risk map. A few of the updates include: a new map search for flood map data, providing preliminary data on the site, and improved Web Map Service for GIS users.

**Product Search by...**

Address

1) Select a Product

2) Enter a US Address or Place:

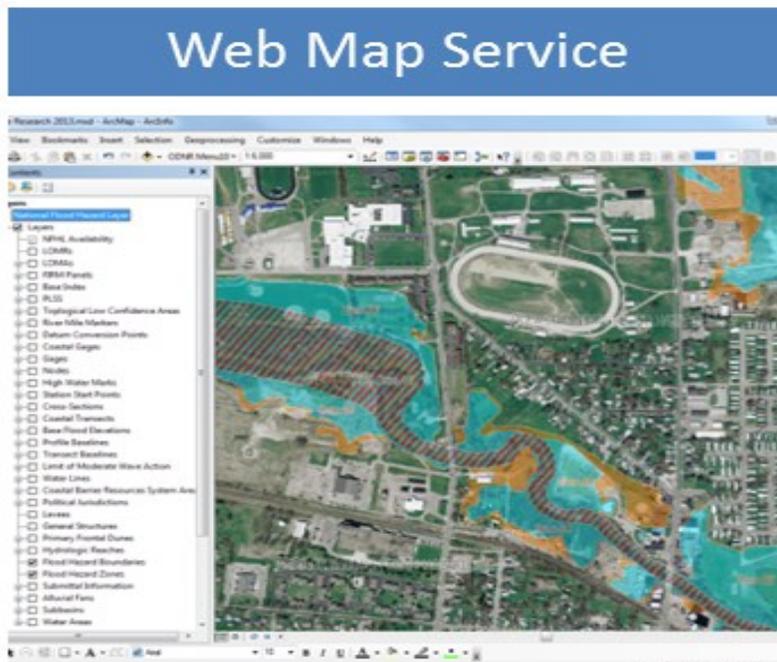
Map-based Search

If you are a new floodplain administrator then you may not be familiar with the FEMA MSC. The MSC is where FEMA hosts the flood maps, flood insurance studies, and digital data from the current mapping projects. The products are free to local floodplain administrators after creating an account and registering with the MSC as an exempt user. For those not exempt there is a minor processing fee for data.

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Updates have been made to the map panel search. At the opening page of the map service center there is a “Product Search by...” option which has been redone to have a map based search as the default. If you uncheck the box the panel that best matches the search is opened in a new window. With the Map-based Search box checked a map will open where you can select a panel based on a point or draw a polygon. The old Map Search method was very slow to load but the new map has an updated search engine as well as BING maps as the basemap, and so it refreshes quickly. There are a couple of issues to be careful of when using this service. The first is that some communities that are not yet DFIRM, have annexed portions of the flood hazard from the county unincorporated areas, but are listed as unmapped. A few examples of these are Ada, Alger, Botkins, Bryan, and Leipsic. Another reason for being listed as unmapped is if the community is not a participant in the NFIP, so their maps status has not been updated.

Preliminary Maps have been added for download and viewing from the MSC as well. The preliminary data for Ohio can be found at 2 locations: the STARR team site here: <http://www.starr-team.com/starr/RegionalWorkspaces/RegionV/Pages/default.aspx> and from the Map Service Center <http://hazards.fema.gov/femaportal/prelimdownload/>. The Map Service



center has recent preliminary maps. For prelims prior to the update see the STARR site. As of July 30, 2013 Shelby and Lawrence preliminary data is available on the MSC for download. (I found that you should use the link above because if you go under the Catalog and select the Future Flood Maps the data wasn't available through that link.)

ArcGIS users have a new Web Map Service that can be utilized. The map service hosts the National Flood Hazard Layer

*Continued on page 18*

compiled from the Digital Flood Insurance Rate Map (DFIRM) data produced from the new mapping. The old map service was prone to crashing and would hang when trying to refresh in ESRI's Arcmap. I have found that it can still have bugs but this is a move in the right direction in order to better provide the most current data to the users. The new WMS path and directions can be found here: <https://hazards.fema.gov/femaportal/wps/portal/NFHLWMS>. The new service has the current map symbology from the FEMA guidelines and specifications. The new web map service is a compilation of the datasets that went into the physical maps. If you want the data behind this on a statewide compilation you can order a DVD of the NFHL from the MSC by selecting it in the product catalog. The NFHL DVD can be ordered for free even if you don't have an exempt account.

The new tools are ways to help identify risk in your community. Using the data not only helps identify risk but also can be used to document the risk. By using the FEMA FIRMetools which are part of the map service center you can create a custom map to put with the community permitting documentation. These services are valuable tools for the Floodplain Administrators toolbox.

## **Floodplain and Environmental Education**

*Matt Knittel, Environmental Specialist Floodplain Management Program*

**P**rotecting the natural, beneficial functions of Ohio's floodplains is just one of our objectives in the Floodplain Management Program, here at ODNR. Floodplains provide resources for our waterways to help ensure that the waterways stay clean and moving properly. When the floodplains are disturbed, waterways can cause more damage through processes like erosion, as well as not having areas to deposit excess sediments, nutrients and other compounds that have



been picked up. There are scientists across the world, and even a good handful here in Ohio, who study the relationship between waterways and their floodplains. However, this information isn't useful if it is not distributed to the general populace. That is where the Floodplain Management Program comes in. Besides leading seminars, conferences and other meetings for engineers, scientists, community officials, and home and business owners, we occasionally assist

*Continued on page 19*

in teaching Ohio students about their environment. I had the opportunity to do this in early June.

On a cool, clear, early summer day, I attended a 4-H camp down in Jackson County to give a presentation to a group of 6<sup>th</sup>-8<sup>th</sup> grade students with an interest in a career in the natural sciences. Sitting in a little log cabin, I discussed with the students the importance of scientific inquiry – of setting a hypothesis and testing to determine if the hypothesis was correct. The students then made a hypothesis about the quality of the tiny stream that ran behind the cabin, before we went outside to do a biological sampling to determine the water quality. Using kick nets and dip nets, we tested for macroinvertebrates (“bugs” that live in the water), to collect and examine. Different macroinvertebrates have higher or lower tolerances for pollution, oxygen levels, and disturbances – therefore, by examining which macroinvertebrates are collected, we can determine the overall quality of the stream.



The students had a great time getting in the stream, and turning over rocks, logs and leaf piles to find the macroinvertebrates. They enjoyed competing with each other to find the most specimens, or the largest specimen. After our collecting, they even competed with each other to see who could identify their specimens the quickest (and of course, correctly.) We ended up with only a few different species, who were all moderately tolerate of poorer conditions – which we discussed is what we would expect to see in a small, very slowly moving stream. When asked what factors may have provided us with more species, the students eagerly gave their theories, and when questioned further, were able to outline a study in order to test their theory.

*Continued on page 20*

That was the main reason that I partook in this experience, and why I have involved myself in environmental education in the past as well. Sure, we discussed streams and floodplains, and their importance to the ecosystem; but my real goal was to engage students in a real scientific study, to have them enjoy it, and to have them think independently. That is what real environmental education is about. It's not about telling students trees are good, pollution is bad - I believe you'd be hard pressed to find a student who doesn't know that. Rather, the goal is to engage students in thinking critically and independently about the world around them. This will not only prepare them for careers in the sciences, but for life in general. Having the ability to examine an issue, and conduct your own study to determine the facts, and come to the best conclusion is an extremely valuable life skill – no matter what your occupation may be.

### In Memoriam



We sadly convey the news that Dave Simpson, City of Rittman Floodplain Administrator, died unexpectedly Sunday, May 5, 2013, at his home.

David R. Simpson was born February 8, 1958 in Wadsworth to Forest and Zola (Combs) Simpson and was a 1976 graduate of Doylestown High School. He lived most of his life in Rittman, where he was employed by the city since 1979, the last 20 years serving as City Service Director. He also had owned and operated Simpson Automotive in Rittman.

## Environmental Professionals Network

*An Online Community Connecting Ohio's Environmental Professionals*

**W**here will the next generation of floodplain managers come from? Consider these converging trends:

- Employers looking to hire professionals in environmental science and engineering are reporting a shortage of qualified applicants.

*Continued on page 21*

- Most high school students, and even teachers and career counselors, have little understanding of the wide variety of things environmental professionals do, or the training and skills required.
- Ohio is emphasizing Science, Technology, Engineering and Mathematics (STEM) fields to prepare students for jobs in the state's emerging high-tech economy.
- The Ohio Department of Education's learning standards and model curriculum also emphasize student learning about real-world careers.

Schools and career centers are looking for business professionals to provide role models and diverse work-place experiences for their students. They are having trouble finding us.

Would you be willing to talk with high school students about what you do as a professional?

Ohio EPA has been working with the Environmental Education Council of Ohio to recruit Environmental **Career Ambassadors** who might be willing to participate in local school Career Days or make a classroom presentation to students about their career paths. Would your company or agency consider hosting a school field trip? Do you have internships for high school or college students? Could you provide a shadowing opportunity for students to see what professionals do? Could you help recruit other Career Ambassadors?

OSU recently created the **Environmental Professionals Network (EPN)**, an online community connecting Ohio professionals in

- Air quality
- Environmental Health and Policy
- Energy, Materials and Sustainability
- Land Use and Conservation
- Water resources and water quality
- Wildlife and ecosystems

EPN members share information, announce events and training opportunities, post/seek jobs, internships and volunteer opportunities, and find collaborators for projects. The network is not limited to Buckeyes. Now EPN members can also volunteer to introduce Ohio high school students to careers in environmental science and engineering. You select the activities you might want to be involved in, and check **Career Ambassador** in your EPN member profile. Teachers and career counselors in your area will be able to contact you through the EPN to invite you to speak to students in local schools, schedule a field trip, or whatever activities you selected based on your own level of interest and availability.

No time for this? Not sure you would be good at speaking to young people? You only sign up for what you're comfortable doing, and you can decline any request from a school. More than 70 large companies and local, state and federal agencies have signed on as supporters of this initiative. OSU, Ohio EPA and EECO are trying to recruit at least 500 Environmental Career Ambassadors, with some available in every county. Watch for more information at <http://epn.osu.edu> and [www.eeco-online](http://www.eeco-online) or contact [Carolyn.watkins@epa.state.oh.us](mailto:Carolyn.watkins@epa.state.oh.us) with questions. 

## ASFPM 2013 National Conference

*Jarrold Hittle, CFM, Environmental Specialist, Floodplain Management Program*

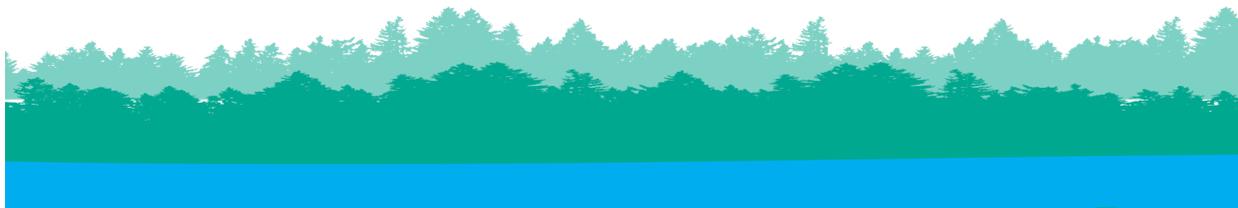


This year ODNR staffers Katherine Skalak and Jarrod Hittle were fortunate enough to attend the 37<sup>th</sup> annual Association of State Floodplain Managers (ASFPM) National Conference in Hartford, CT. The presentations were informative, innovative, and it allowed floodplain officials from across the nation to share their successes and failures so attendees could bring ideas back to their respective communities.

To me, the main focal point was on the Biggert-Waters Flood Insurance Reform Act of 2012. There were many sessions dedicated to BW-12 with the week's highlight being a town-hall style meeting. The meeting allowed floodplain officials to question FEMA-staff about specifics of BW-12. This helped to clear up some of the confusion and prepare state and local officials for the many questions that will, without a doubt, come our way.

Floodplain tours were also offered, and we opted to take the "Coastal Connecticut" tour. The coastal tour focused on areas damaged during hurricanes Irene and Sandy. Connecticut floodplain officials led the tour showing us pictures of the damage sustained after the storms, and we were able to see how area residences and infrastructure were rebuilt. On one stop in particular there was a house under construction that was being built out of compliance (below BFE). It just goes to show you that a good floodplain manager has to be resilient.

It is hard to sum up a week's worth of conference highlights in a short article, since there was so much information provided throughout the week. I would encourage anyone interested in viewing some of the presentations to visit the ASFPM website at <http://www.floods.org/index.asp?menuid=786>



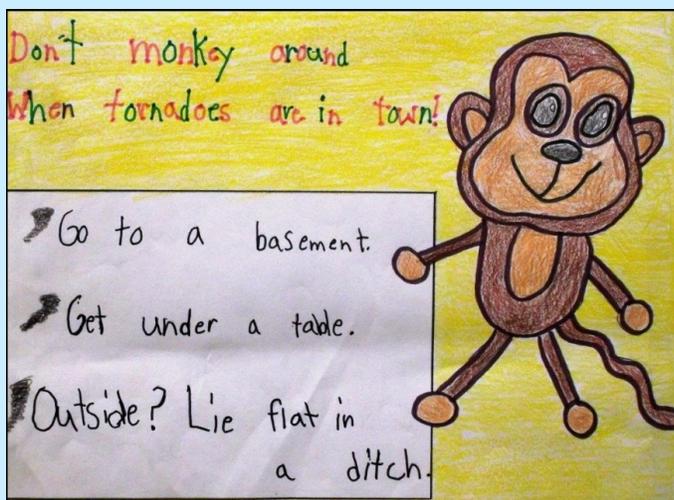


### Farewell and Good Wishes to Ben Kelley

Ben Kelley left the Floodplain Management Program in March 2013 for a new position with ODNR's Division of Forestry. He is working as a Forester, where he hugs trees and helps to manage forests in South East Ohio.

Congratulations to Ben on this new opportunity!

The following are more posters from the Severe Weather Awareness 2013 Poster Competition See page 11 for the full story and this year's top winner.



1st Grade Winner:  
Grace Draeger, Sandusky County

3rd Grade Winner:  
Landon Long, Pickaway County



# *The Antediluvian*

*Ohio's Floodplain Management Newsletter*

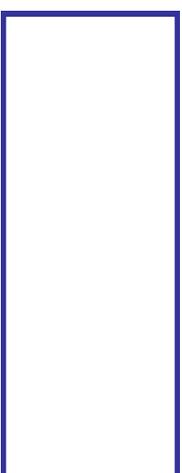


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Matthew J. Knittel, Editor.

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