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NAS SOUTH WEYMOUTH
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MINUTES AND AGENDA FOR RESTORATION ADVISORY BOARD MEETING HELD 9 APRIL 2007 NAS SOUTH WEYMOUTH MA
08/09/2007
NAVAL AIR STATION SOUTH WEYMOUTH

Naval Air Station
South Weymouth, MA
Restoration Advisory Board
Summary of RAB Meeting – August 9, 2007

NAS South Weymouth Website: http://nas-southweymouth.navy-env.com

1. INTRODUCTIONS/ APPROVAL OF PRIOR MEETING MINUTES

Mary Skelton Roberts opened the meeting at approximately 7:15 PM. She requested that all attendees, including RAB members, regulators, and audience members, introduce themselves. She noted that the meeting agenda, handouts and the sign-in sheet were available on the back table. The sign-in sheet for the meeting is provided as Attachment A to this meeting summary. M. Skelton Roberts asked if everyone had time to read the update from the public hearing (July 2007) and asked for comments. There were no comments offered. A moment of silence was held for Verna Hayes.

M. Skelton Roberts then reviewed the ground rules for the meeting and reminded the meeting attendees that the focus of the meeting is cleanup issues; redevelopment issues will be placed on the 'parking lot.' She reviewed the guidelines for the meeting and reminded the participants when asking questions to wait to speak until they are acknowledged, to state their names and affiliations, and to speak into the microphone when they have questions.

M. Skelton Roberts then reviewed the agenda and presentations scheduled for the meeting. The Agenda for the meeting and the Action Item Tracking List are provided as Attachment B to this meeting summary. In accordance with the agenda, the presentations would be followed by the Updates and Action Items portion of the meeting.

2. PRESENTATIONS

M. Skelton Roberts introduced Dave Barney to introduce the Ecological Risk Assessment Technical Memorandum Update. The following paragraphs summarize the presentation and include references to selected presentation slides in Attachment C. The complete presentation is available on the NAS South Weymouth web site: **http://nas-southweymouth.navy-env.com**.

The Ecological Risk Assessment (ERA) process began in late 1999, between the Phase I and Phase II Remedial Investigations. The current basewide ERA was completed to expand upon the site-specific ERAs that were provided in the Remedial Investigations conducted for individual environmental sites. The basewide ERA technical memorandum is still in draft form, but will be submitted shortly to the

regulatory agencies for review and comment. Therefore, the presentation is principally the Navy's position and opinions.

The ERA is the fourth part of a four-part series of technical memoranda, comprising the basewide study: hydrogeological, French Stream geochemical, human health risk, and ecological risk (Slide 2). The French Stream Ecological Assessment will be discussed first and the Higher Trophic Level Assessment will be the second presentation.

D. Barney introduced Christine Archer, ENSR, to continue the presentation. She stated that the ERA includes two presentations. The first presentation focuses on French Stream and the potential impact to the fish and macroinvertebrates. The second presentation focuses on the higher trophic level, e.g., animals that are higher up on the food chain and are more likely to have basewide exposure. ERAs have been completed for individual environmental sites over the years, but had not been compiled and compared at a basewide level (Slide 3).

French's Stream has a west branch and an east branch, and the stream is a relatively straight body of water. The iron floc has been observed throughout French Stream. The ecological risk assessment of French's Stream was conducted according to EPA guidelines, and used a dataset the Navy had available from environmental sites being evaluated under a number of different programs. This risk assessment focused on surface water, sediment, and iron floc found in French Stream. Data were available for a number of different chemical parameters, and also from toxicity testing, a macroinvertebrate community survey, and tissue chemistry. The majority of the data were collected during the Phase II Remedial Investigation. Some of this data has been evaluated previously for specific sites, and some has been collected but not previously evaluated. The biological samples used in the ERA include both fish and amphibian tissue samples, samples for toxicity tests, and a macroinvertebrate survey conducted to evaluate the insect community within the stream. Also, data from the floc samples collected by the Navy in December 2005 as part of the basewide assessment were evaluated (Slide 4).

The ERA looked at a number of "lines of evidence" to complete the assessment and determine conditions in French Stream. The approach used in the French Stream ERA included comparison of sediment and surface water data to background samples and ecological benchmarks, review of toxicity testing and macroinvertebrate survey results, tissue data, and floc data (Slide 5).

Slide 6 presents sediment concentrations vs. ecological benchmarks for each French Stream sample location. The blue line represents the maximum background concentration available in the dataset. The light black line represents the highest concentration with no effect and no adverse effects. The heavy black line represents the lowest concentration with a probable effect, and in many cases there is an

impact to the ecological community, such as a reduction in growth or reduction in reproduction. The space between the light black line and heavy black line is a gray area where concentrations may or may not have an impact on the ecological community. A conclusion regarding ecological risk can not be reached based on the sediment chemical data compared to ecological benchmarks due to the variability, so other end points and lines of evidence must be looked at.

The second line of evidence that was evaluated is toxicity testing data. Sediment samples were collected and two different test species, amphipods and midges, were exposed to the sediment for 10 days. The tests looked at the survival and growth rate in the two species after the 10-day period. Samples from 12 French Stream stations and 5 reference stations were analyzed for toxicity. A 75 percent, or above, survival line shows a healthy environment within the sediment. The survival at the majority of French Stream and reference stations was greater than 75 percent; therefore there are no survival impacts to these organisms based on exposure to these sediments (Slide 7). The average growth from reference stations was then compared to the midge and amphipod growth end points. The growth end points were more variable than the survival end points. There were a couple of instances with reduced growth in particular samples relative to the reference samples, but when the average data from the French Stream stations and reference stations was compared there was no statistical difference between them (Slide 8). The conclusion from the toxicity test data is there might be slight impact to the growth end points in this particular test.

S. Ivas asked about the location of the reference stations. C. Archer stated there were on base property, but were upstream locations.

P. Scannell asked if the midge and amphipod species used were collected from French Stream and compared to other midge and amphipods on the Base. C. Archer responded that the sediment samples were collected from the Base and the midge and amphipods were cultured by the laboratory, specifically for use in such toxicity tests.

The third line of evidence is the macroinvertebrate surveys conducted within French Stream. These surveys included collection of invertebrates within French Stream to assess the benthic community. The sediment samples were collected, sorted, and identified for taxonomy of the organisms (Slide 9). An example of macroinvertebrates are amphipods, they are the insects present within the sediment and streambed itself. This test shows the relationship between the biological communities present in the stream, the habitat present in the stream, and the stream surface water and sediment chemistry. A statistical evaluation was performed to look for the relationships between organisms and sediment concentrations from the given location.

The macroinvertebrate survey results showed a moderately stress-tolerant community throughout French Stream. Different species have different levels of tolerance to environmental stresses. A similar level of impact was shown throughout French Stream. The statistical evaluation of concentrations in sediments verses the results in the macroinvertebrate survey showed no correlation with a particular chemical in the sediment.

B. Olson asked if there was a statistical difference between sediment concentrations in the reference samples as compared to the other samples from French Stream. C. Archer stated that they have not compared those data sets statistically.

A. Malewicz asked if there was a peak of metals concentrations. C. Archer stated that there was a bit of peak near the TACAN outfall but the samples were collected before any cleanup was completed.

M. Parsons asked about the slide that showed a spike in DDE concentration and where was the location of the highest concentrations. C. Archer responded that the highest concentrations of DDE, an insecticide, were upstream locations, at the north end of the Base.

The fourth line of evidence used in the ERA was the floc data collected by the Navy between December 2005 and May 2006. The floc was quite prevalent throughout French Stream, although not found at every location in the December survey.

M. Parsons asked if the floc concentration was heaviest at the southern portion of the Base. C. Archer stated that there were only four floc samples collected for laboratory analysis and she was not sure which location had the highest concentrations. She stated that the concentrations of metals in the floc exceeded surface water benchmarks.

There were additional endpoints analyzed, as well. The surface water concentrations at some locations exceeded benchmarks, which indicate potential adverse impacts to organisms in the stream. The concentrations of chemicals in tissue (fish and amphibian) were quite low, both in French Stream and reference samples. All tissue concentrations were less than tissue concentrations that would result in an impact to fish. The statistical evaluation showed no strong relationship between chemical and biological response (toxicity tests and macroinvertebrate survey).

In conclusion, based on available information, impacts to animals within French Stream are very low (Slide 10). If there is impact it is limited to a sub-lethal effect, like growth. There is no statistical relationship between the sediment chemistry results and the various lines of evidence. The iron and manganese concentrations do not correlate to any of the results and do not correspond to the potential

adverse impact. The French Stream assessment concludes that, although there is some degree of impairment within French Stream, it does not appear to be related to concentrations of chemicals in surface water and sediment and the impairment is relatively consistent throughout the stream.

P. Scannell asked if the impairment is not from the chemicals, what would be the cause. C. Archer responded that conditions in stream itself are not ideal for the macroinvertebrates identified in the survey, and thus it may be the habitat in general.

M. Gerath, ENSR, stated that the degree of impairment observed is not that unusual for a stream whose watershed is full of storm water sources and where there are issues of lack of shade in various parts of the stream. The levels of impairment are comparable to streams in other systems around the state. It is difficult to determine the source of impairment in a system like this, but the conclusion is the impairment is not related to the floc or the chemicals in the sediment.

D. Galluzzo was critical that the location of the four floc samples was not known. He also stated his concern about potential leaching from the West Gate Landfill (WGL) into French Stream. Were there any samples taken near there? C. Archer stated that samples collected for toxicity tests were taken from French Stream near the WGL and that the locations of the floc samples were known but the map was not included in the presentation.

D. Galluzzo then asked why the Base is a Superfund site. B. Olson stated that at the time the Base was placed on the NPL, EPA felt it should be listed due to the risk assessments. Since then, there has been a lot of work completed, remediation and removal actions have occurred. He stated that the Base is a lot cleaner now then it was when it was declared a Superfund site. There is still work to be done. As far as the WGL, capping is a presumptive remedy for landfills, because EPA believes it is effective.

D. Chaffin stated that a risk was determined at the WGL and thus remediation will occur.

D. Barney added a note to the Action Items list to indicate the location of the floc samples.

B. Olson stated that EPA also took floc samples, separate from the Navy, so there are two different datasets. The EPA took surface water samples with some floc mixed in and then tried to take samples of pure floc. The floc results were quite variable due to the fact that samples of floc had to be separated as much as possible from the surface water. Technically the floc is really both surface water and also more “solid,” so it is difficult to separate it from surface water. It is difficult to determine the highest concentration of floc due to the high variability in the results. The surface water concentrations are

actually indicative of what is moving downstream and offsite. Potentially the sediment concentrations downstream may be indicative of what is moving offsite, as well.

M. Parsons asked if any off-site samples were taken in the stream without floc. C. Archer stated that there were no samples taken off the Base property. EPA took samples off the Base and the results were quite variable and generally indicated high iron concentrations. B. Olson mentioned that the floc presentation and investigation (July 2006 RAB) tried to determine whether the source was environmental sites on base or more natural causes, such as the filled wetlands. There are a number of filled wetlands and it is difficult to determine the origin of the floc.

A question was asked why you would put a fence around the WGL after it is capped, does that mean it is still hazardous? The response was that the fence would be there to protect the cap; the cap would prevent exposure, not the fence.

P. Scannell asked if there were any VOCs or arsenic detected in French Stream. C. Archer stated that VOCs were not compounds of concern in the sediment. Arsenic was detected, along with most of the metals, and PAHs and PCBs were detected in the sediment.

M. Bromberg asked if the other streams on the Base were checked out. C. Archer responded that this study was specifically focused on French Stream. D. Barney added that some of the background locations were from Twin Ponds area and other water bodies on the Base.

M. Bromberg asked how many fish were involved in the study. C. Archer stated that the study looked at red fin pickerel found in French Stream, and areas beyond French Stream. Some of the samples analyzed were composite samples, so there were a greater number of tissues samples included in the study. The fish were all collected live, no dead fish were analyzed.

M. Bromberg asked if this report was consistent with the Fred SaintOurs thesis. S. Ivas stated that he thinks these conclusions are consistent. M. Bromberg asked if there was any E. coli. C. Archer stated that they did not do bacterial tests. Bacteria were not analyzed in fish, either. Amphibian tissue was looked at in this study, but the data set used to determine healthy amphibians is not as extensive as the data set for fish.

C. Archer then continued the presentation; the second ERA looked at food chain impacts at higher tropic levels. Higher trophic levels refers to animals higher up on the food chain have large home ranges and are animals that eat others, which leads to a potential for accumulation of chemicals through the food chain (Slide 11). Slide 12 illustrates food chain relationships from lower to higher trophic level animals.

Existing chemical data from a variety of different programs was used in this ERA. Again, some of the information had been evaluated before and some was evaluated for the first time. The higher tropic level ERA focused on surficial soil, surface water, sediment, and tissue data from many different organisms. Data from individual samples collected from areas that have been remediated were not evaluated (i.e. RDA, TACAN, FFTA) in the food chain. Slide 13 presents the number of samples evaluated for each medium. The data were selected to assess areas likely to be impacted, due to the fact that most of the samples were collected from specific environmental sites on the Base.

For this ERA, the data were evaluated by looking at both the maximum and average concentrations. The daily dose for each chemical and receptor was determined. The daily dose was then compared to the Toxicity Reference Value (TRV), which is the concentration of a chemical that is not expected to have an impact on a mammal. The daily dose divided by the TRV is the hazard quotient (HQ). If the HQ is less than one (the dose is less than the toxicity value) no adverse effects are expected. If the HQ is greater than one (the dose is greater than the toxicity value) there is a potential for adverse effects. (Slide 14)

Eighteen bioaccumulative chemicals were evaluated. Eleven of the eighteen chemicals had an HQ less than one for all receptors. Seven chemicals had HQs greater than one for at least one animal using the maximum concentration (Slide 15). If the average concentration were evaluated, some of these chemicals would have HQs less than one.

P. Scannell asked how the daily dose was determined, if it looked at 365 days per year. M. Gerath responded that the animals, such as a hawk, will not be on the Base for 365 days a year. The safe value assumes regular exposure throughout life span based on literature studies.

R. Sugatt stated that the safe dose is determined from laboratory studies and adjusted for factors to other animals. He noted that egg shells were not tested but the back up studies from the literature for DDT probably looked at eggshell data. The TRVs for DDE and DDT may be based on egg studies, such as egg hatchability, etc. He also stated that if the HQ is very high, then often samplers will return to a site and collect site specific samples, such as collecting feathers, etc. At Weymouth, the HQs are low enough that additional sampling is not necessary.

The average concentrations show no risk to the raccoon and hawk. It was determined that the tissue concentration was driving the higher HQ values, not the concentration in the sediment, soil, or surface water.

A. Malewicz asked where the maximum concentration of methyl mercury was located, the sample that caused the raccoon HQ to be greater than one. C. Archer stated that the one sample was from the STP. The HQ values greater than one for the kingfisher were driven by samples taken near RDA.

Slide 16 presents the results of the higher trophic level ERA. The tissue concentrations driving the higher HQ values were from samples collected mainly from WGL, STP, and aquatic areas downstream of the RDA. HQs were greater than one for a small subset of chemicals. The remedial actions at these sites will eliminate the exposure and the HQ will thus be reduced. A food web model was also completed assuming exposure to the floc and the HQ value was well below one. These ERA conclusions are presented on Slide 17.

C. Archer concluded the presentations by stating that three draft technical memoranda have been submitted to the agencies and comments have been received for two of them. The two ERA draft technical memoranda will be submitted in August 2007 (Slide 18).

D. Galluzzo asked if there could be actual samples collected from different animals on the Base and tested, instead of modeling. R. Sugatt stated that the HQs determined for the Base are not high enough to result in EPA requiring additional testing. EPA would only require this level of testing if the models show high HQs. With the HQ levels on the Base, if the studies were performed you would not see the effects, which makes the studies unwarranted in this area. B. Olson reminded everyone that the EPA had not seen and commented on the ERA reports, yet.

H. Welch asked about bird studies used to determine the cumulative effect of chemicals. R. Sugatt described a typical bird study. Birdhouses are set up all over the site and a clean (e.g., reference) area as well. The number of eggs produced and hatched are counted. Blood samples are collected from the baby birds and see how much of the chemical is present in the blood. Swallows eat insects, thousands of them, so it is a measure of the cumulative effect of these chemicals. This type of study requires significant resources and therefore is only conducted when a risk is determined.

H. Welch asked why other animals were not tested. R. Sugatt stated that bioaccumulation is most noticeable in carnivorous animals, so those are the most useful in tests.

M. Parsons asked about the health of the PCB-eating mouse. R. Sugatt stated that they probably did not know the condition of the mouse before it was collected. There will be more mammals tested during the five year review at the RDA. No additional testing was completed for animals higher up on the food chain. Modeling was completed for higher trophic animals at RDA, from the mouse to predators of the mouse.

In response to other questions: no eggshells and no carcinogens were tested as part of the ERA.

J. Cunningham will bring the SSTTDC letters responding to parking lot issues to the RAB meeting next month (Action Item). The letters were distributed at the April or May RAB meeting.

3. UPDATES AND ACTION ITEMS

M. Skelton Roberts reviewed the action item listed on the Action Item Tracking List (see Attachment B) for this RAB meeting:

MDPH MS Study update: B. Olson stated that he had contacted Suzanne Condon (MDPH) and had a meeting with her. She stated that there has been a delay in the draft report submittal due to office issues. The draft report has been submitted to ATSDR (national group that is overseeing MDPH) and a response from ATSDR is expected in the fall. Hopefully in late fall MDPH will provide an update or a presentation.

M. Skelton Roberts asked each of the Leads to provide updates to the list of Update Items.

RAB Administrative Actions: D. Barney stated that there may be a need to change the location of the RAB meetings in the future. Due to changes in the tenant, the Conference Center may not remain available.

MADEP Update: D. Chaffin stated that for the sites they have been overseeing, FFTA and Small Landfill, they are waiting for appropriate documents to come from the Navy.

Coast Guard Update: D. Barney received no update. EPA stated that they just received a wetlands inspection report. The Coast Guard is completing a Remedial Action Completion Report. They will also provide the wetlands/swale sample results from monitoring program.

IR Program Site Update: The second round of data has been collected at RDA and is in validation in accordance with the LTMP. The Navy has submitted a draft ROD for WGL (to cap the landfill) to the agencies for their review this week. The STP public hearing will likely be held on September 13, to present Navy's Proposed Plan to address the risks at that site. The Proposed Plan should be distributed by the end of August. The Building 81 and Building 82 RI reports are in their final stages. The Building 82 RI Report will probably be presented at the October RAB. The SRA data are being reviewed to determine if additional information needs to be collected or if the remedial investigation process can continue.

MCP Update: The FFTA status report was submitted in July. The close-out of the site was anticipated but they needed to resample to supplement rejected data. The samples were recollected in the beginning of August. Pending favorable data collection, the site will be closed out and be complete.

EBS Update: The RODs for the four AOCs presented to the public in July are underway. Additional samples were collected the first week in August along the storm sewer system/TACAN to address remaining questions and concerns.

Other: The Small Landfill schedule anticipates submitting a Corrective Action Design to DEP by the end of September.

FOST Update: There is no change in the FOST status. FOST 3 is ready for signature and the Navy is continuing resolution of comments for FOST 4.

SSTTDC Update: S. Ivas stated that negotiations continue.

Topics for future RAB Meetings

The following action items and topics were suggested for future meetings:

- Building 82 RI
- Action Item - provide groundwater results for wells on transferred land
    - D. Barney stated that he would provide the groundwater analytical data

Conclusion/Next Meeting

The meeting concluded at approximately 9:30 pm. There will be a public hearing for the STP Proposed Plan on September 13, 2007. The next RAB meeting will be in October.

Naval Air Station South Weymouth
Weymouth, MA
Restoration Advisory Board
RAB Meeting Agenda

9 August 2007 **Conference Center on Shea Memorial Drive** **7:00 PM**

Agenda Items	*Item Lead*	*Projected Time*
1. Introduction, Review of Meeting Notes	**Facilitator**	**7:00 - 7:15**
2. Basewide Ecological Risk Assessments	**Navy**	**7:15 - 7:45**
3. Updates and Action Items	**Navy**	**7:45 - 8:15**
4. Questions, Agenda Items, Next Meeting	**Facilitator**	**8:15 - 8:30**

Facilitator: Massachusetts Office of Dispute Resolution: Mary Skelton-Roberts

Restoration Advisory Board (RAB) Members:

Abington: James Lavin, (Alternate: Steve Ivas); Phil Sortin (Alternate: Beth Sortin)
Hingham: no current representation
Rockland: no current representation
Weymouth: James Cunningham (Community Co-Chair); Ken Hayes; Dan McCormack; Steve White
Navy: Dave Barney (Navy Co-Chair)
EPA: Patty Marajh-Whittemore (Alternate: Pamela Harting-Barrat)
MA DEP: David Chaffin (Alternate: Ann Malewicz)

BRAC Cleanup Team (BCT) Points of Contact:

Navy: Dave Barney, BRAC Environmental Coordinator, Base Realignment and Closure Office, Program Management Office, Northeast (617) 753-4656

Brian Helland, Remedial Project Manager, Base Realignment and Closure Office, Program Management Office, Northeast (215) 897-4912
Email: brian.helland@navy.mil

MA DEP: David Chaffin, Environmental Engineer, Federal Facilities (617) 348-4005
Email: david.chaffin@state.ma.us

EPA: Patty Marajh-Whittemore, Remedial Project Manager, Federal Facilities Section (617) 918-1382 Email: whittemore.patty@epamail.epa.gov

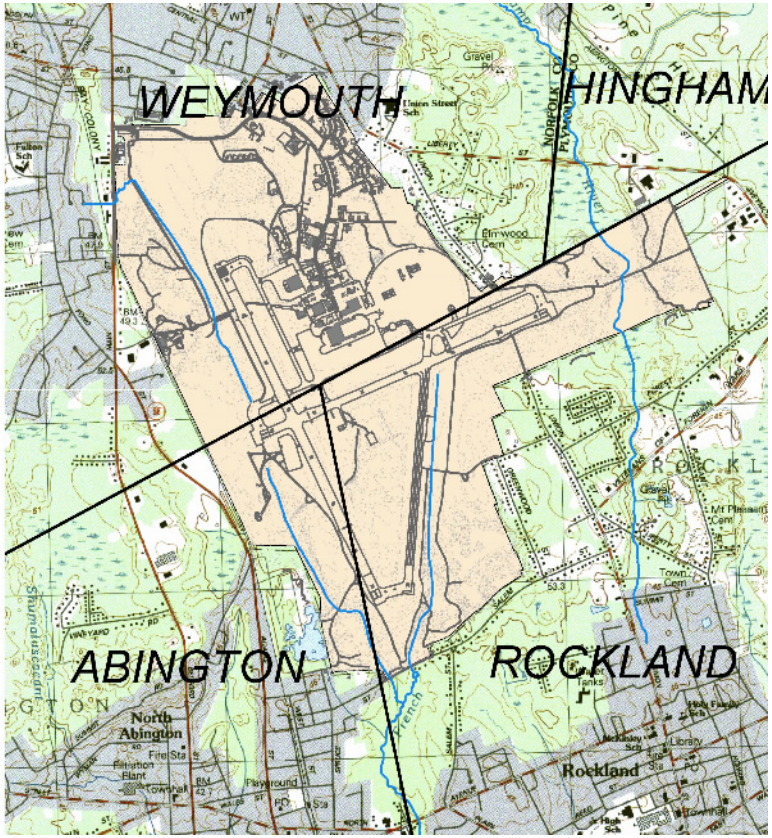
NAS South Weymouth Website: http://nas-southweymouth.navy-env.com

Naval Air Station South Weymouth Restoration Advisory Board Action Item Tracking List

9 August 2007 – Next RAB Meeting

Action Item	Item Lead	Deadline
ACTION ITEMS		
MDPH MS Study update	P. Whittemore	Next RAB
UPDATES		
RAB Administrative Actions	D. Barney	Each RAB
MA DEP Update	D. Chaffin	Each RAB
Coast Guard Buoy Facility Update	R. Marino	Each RAB
IR Program Sites Update	D. Barney	Each RAB
MCP Release Areas Update	D. Barney	Each RAB
EBS Review Item Areas/ Various Removal Action Update	D. Barney	Each RAB
FOST/FOSL/CDR Update	D. Barney	Each RAB
SSTTDC Update	J. Lavin/ S. Ivas	Each RAB
COMPLETED ITEMS		
List of AULs; what and where they are (4/07)		
Provide vernal pools map to J. Cunningham (4/07)		
Copies of figures from Old Swamp River Study by Beta Group, Inc (03/07)		
Provide Hydrogeologic Investigation Tech Memo to D. Galluzzo (03/07)		
Distribute monthly Navy program status/administrative items update (03/07)		
Provide blueprint of old STP to H. Welch (01/07)		
Distribute monthly Navy program status/administrative items update (01/07)		
Check status of NAS South Weymouth website (01/07)		
P. Scannell to provide the reference for the 1995 EPA study to D. Barney (11/06)		
Distribute monthly Navy program status/administrative items update (11/06)		
Were runways in the transferred land tested for fuel oil and PCBs? (11/06)		
1997 DEP letter re: non-potable drinking water source areas on the Base (11/06)		
Map showing sampling locations on the Base (11/06)		
Old Swamp River additional sample collection; data available? (11/06)		
Status of release of MDPH ALS/MS study (11/06)		
Contact Dr. Knorr regarding access to NAS South Weymouth EGIS (7/06)		
Distribute monthly Navy program status/administrative items update (7/06)		
Check availability of MDPH to give a presentation on MS/ALS data (5/06)		
Distribute monthly Navy program status/administrative items update (3/06; 4/06)		
Provide copies of SSTTDC and Mayor Madden letters re: Small Landfill CAAA to M. Parsons (2/06)		
Provide information on vernal pools to M. Byram (2/06)		
Distribute monthly Navy program status/administrative items update (2/06)		
Small Landfill CAAA Update (12/05)		
Distribute monthly Navy program status/administrative items update (12/05)		
Provide details of RDA contractor's upcoming work (10/05)		
Provide details about SSTTDC's unescorted access policy (10/05)		
Provide turtle activity update (8/05)		
Check where upcoming RAB meeting times are posted (8/05)		
Distribute monthly Navy program status/administrative items update (8/05)		

Ecological Risk Assessment
Technical Memorandum Update
Former NAS South Weymouth
Restoration Advisory Board Meeting
August 9, 2007



Objective

- Update the RAB on the Navy's progress on the Basewide Assessment
- Series of Technical Memoranda
  - Basewide Hydrogeological Evaluation
    - December 2006 (agency comments received)
  - French Stream Geochemical Evaluation
    - Floc Assessment (French Stream) (agency comments received)
    - January 2007
  - Human Health Risk Assessment
    - April 2007 (in agency review)
  - Ecological Risk Assessments
    - French Stream
    - Higher Trophic Level Basewide
    - Submitted in August 2007

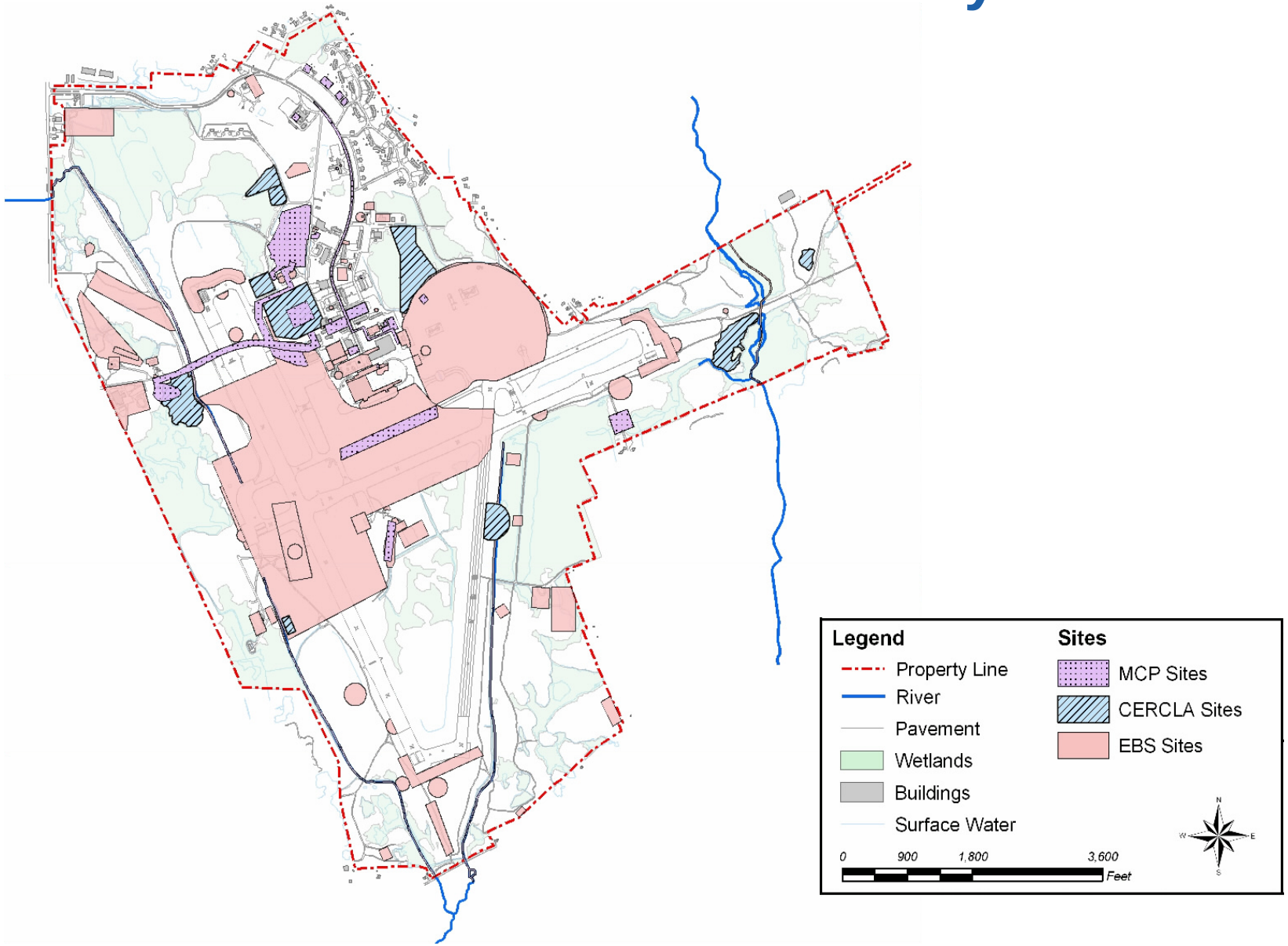
Tonight's Objective

- Update the RAB on the results of the Ecological Risk Assessments (ERA)
  - French Stream: Lower Trophic Level
    - Fish and macroinvertebrates
  - Basewide: Higher Trophic Level
    - Birds and mammals
- Tonight's presentation represents Navy perspective
  - ERAs will be submitted for agency review in August 2007

Purpose of Basewide ERA

- Evaluate potential ecological risks to:
  - Benthic and aquatic receptors from exposure to surface water, sediment, and iron flocculent material in French Stream
  - Wildlife receptors due to Basewide exposure to chemicals in surface water, sediment, surface soil, and prey items

Environmental Sites at NAS South Weymouth



French Stream ERA

- Linear feature
- Characterized by hard bottom
- Limited deposition
- Iron floc prevalent in much of stream

French Stream ERA

- Evaluated comprehensive data set collected by the Navy under EBS, MCP and CERCLA programs
  - Focused on surface water, sediment, and floc
  - Detected chemicals included a variety of semi-volatile organics, hydrocarbon compounds, PCBs, and inorganics
  - Toxicity testing, macroinvertebrate surveys, and tissue chemistry data also included
  - Much of the data was collected during the Phase II Remedial Investigation
- Floc data collected by the Navy were evaluated

Conceptual Model of Floc Formation

Iron- and manganese-rich groundwater discharges into slow moving stream

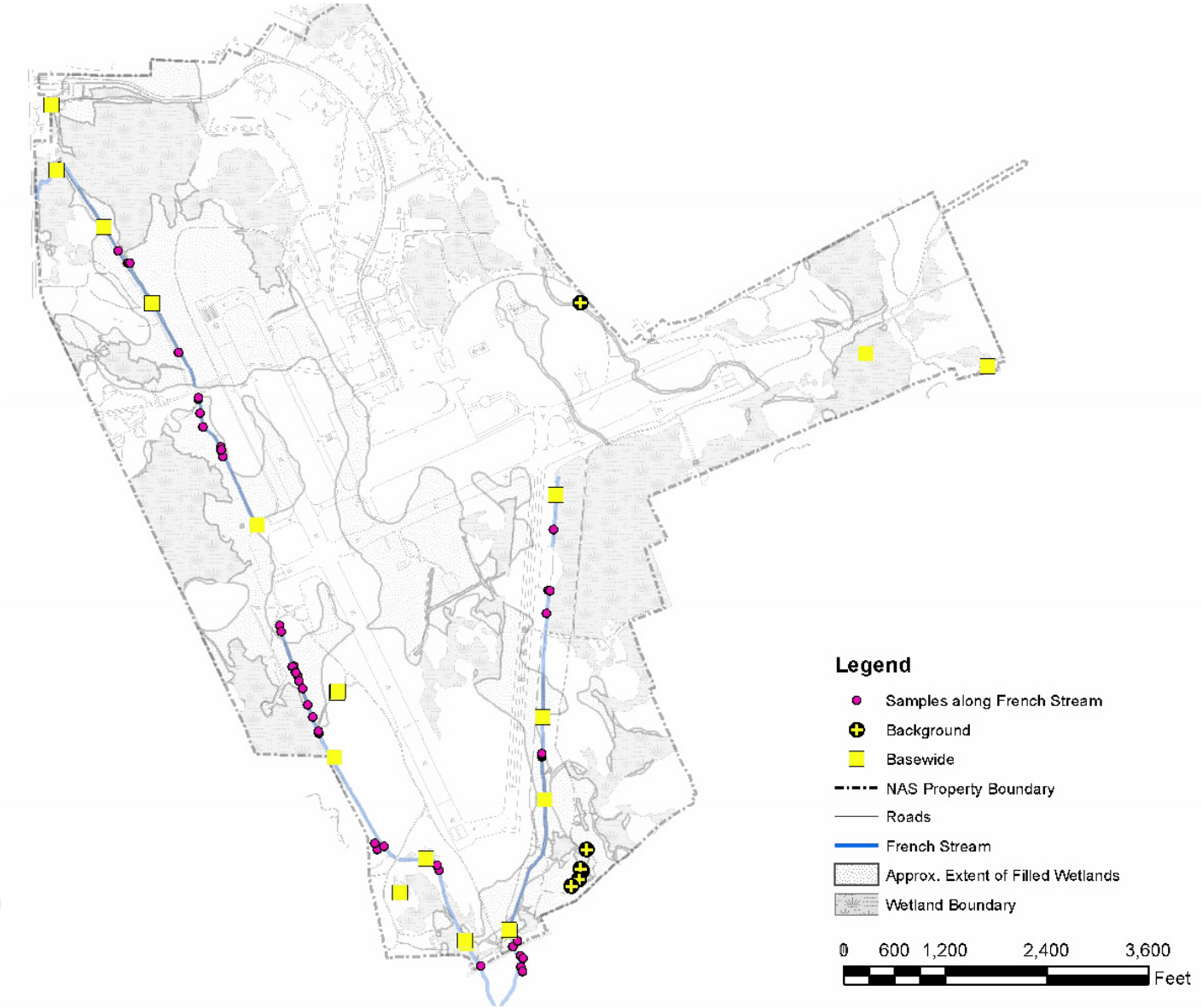
Groundwater mixes with oxygenated stream water

Dissolved iron and manganese become oxidized and precipitate out

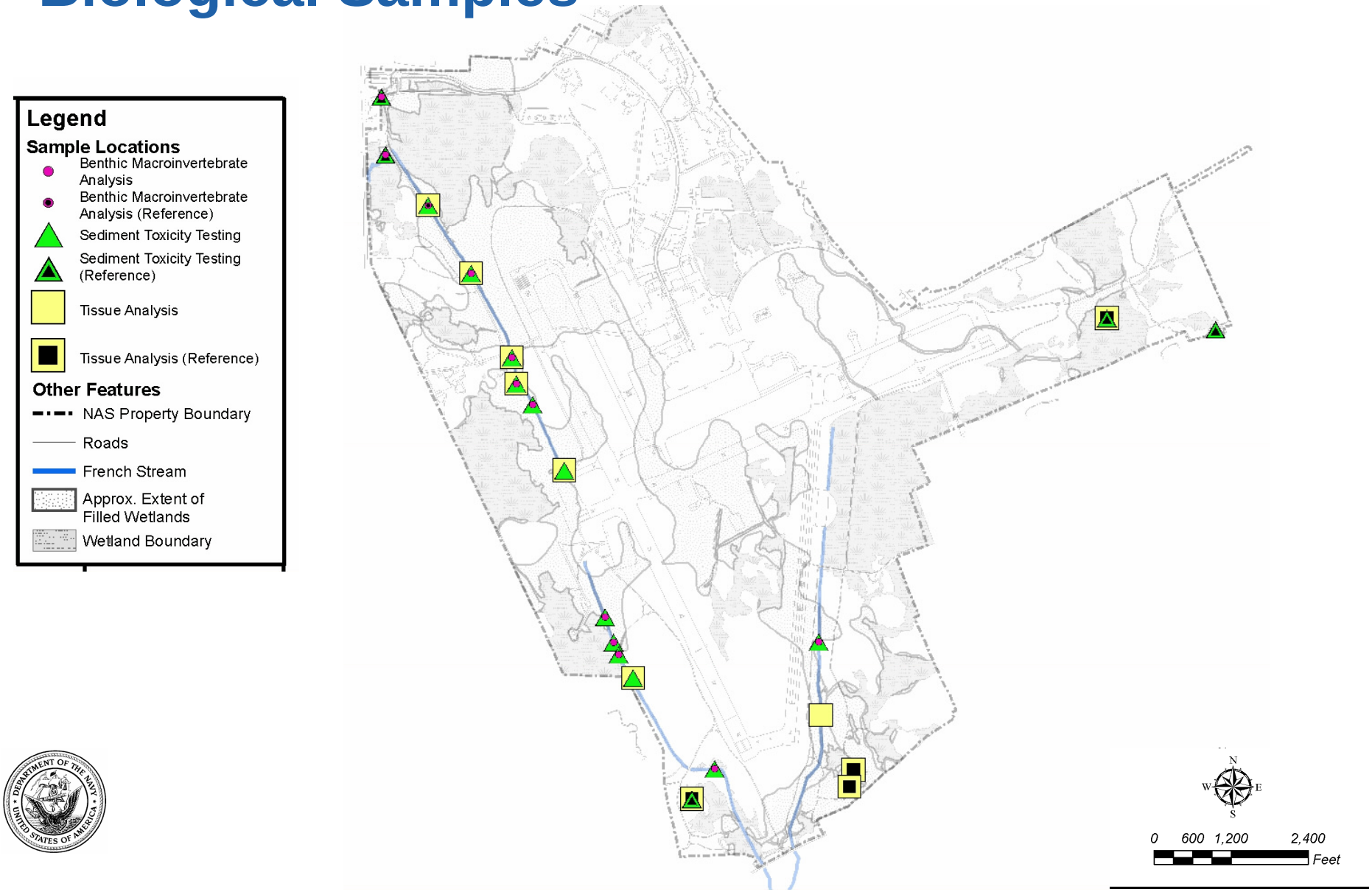
Both an iron source and organic matter must be present to form floc.

Precipitate will settle on the streambed or be carried downstream, often forming clumps of orange floc

Surface Water and Sediment Samples



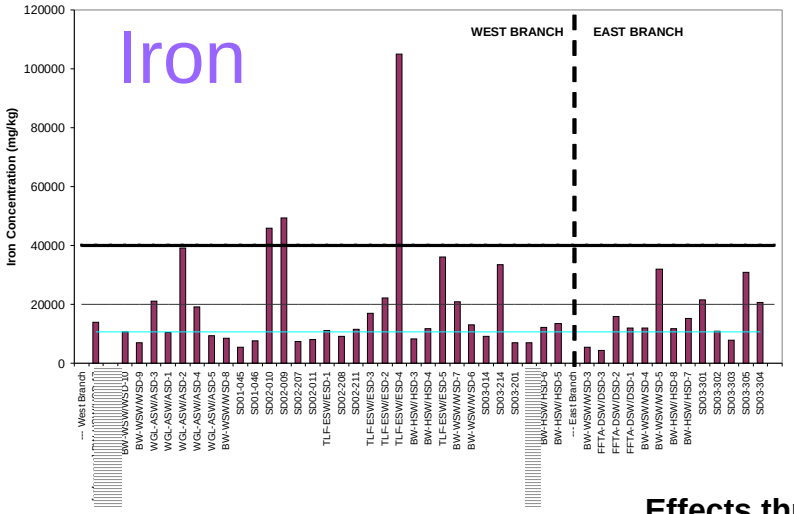
Biological Samples

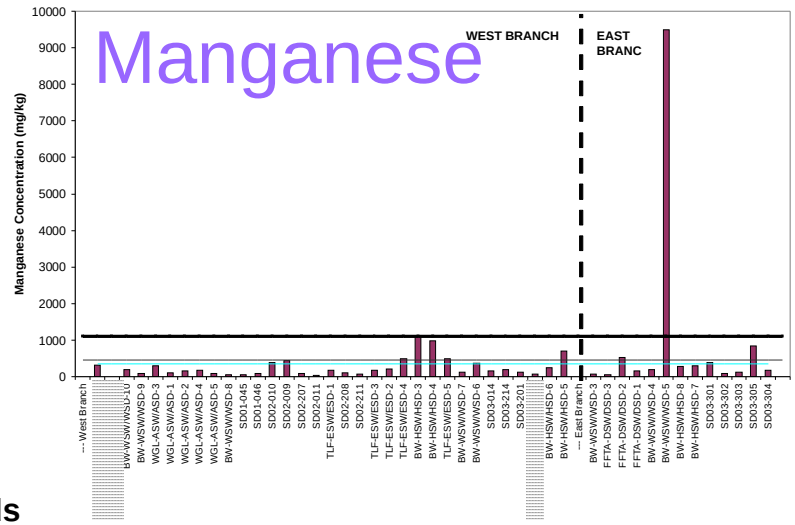


French Stream ERA Approach

- Comparison of sediment and surface water data to background samples and ecological benchmarks
- Review toxicity testing and macroinvertebrate survey results
- Evaluate concentrations of chemicals measured in tissue samples collected from French Stream
- Evaluate floc data relative to benchmarks, toxicity testing results, and macroinvertebrate survey results

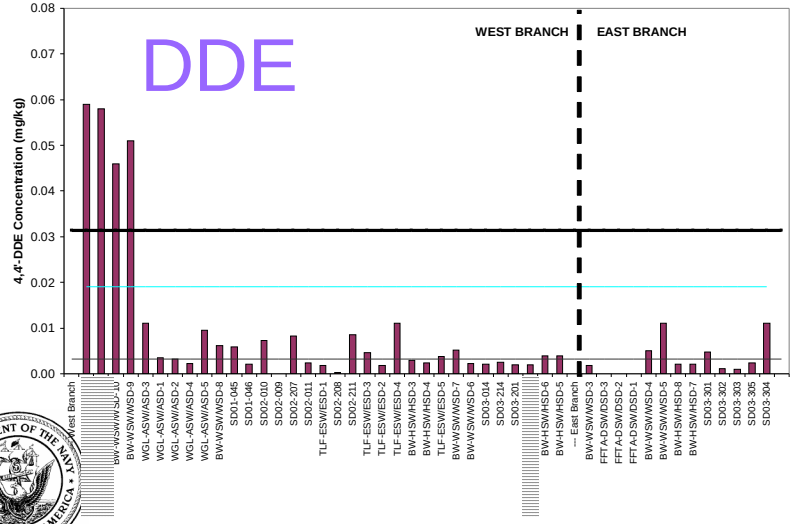
Sediment Concentrations vs Ecological Benchmarks

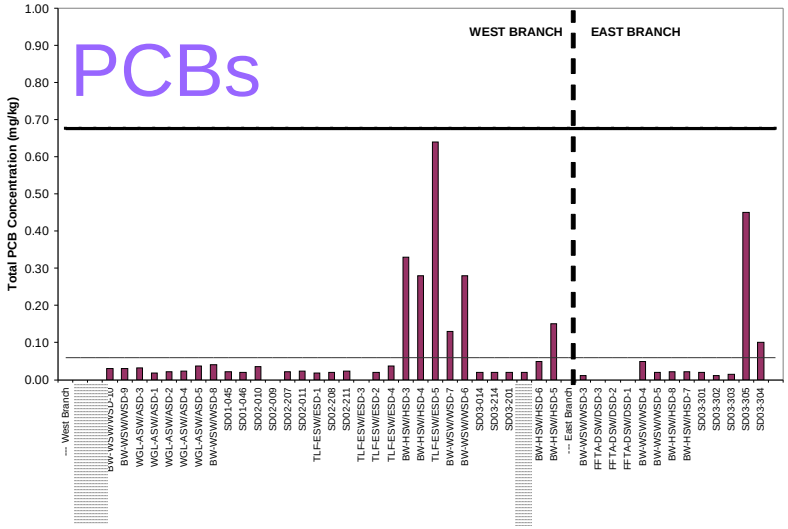




Maximum background level

Effects thresholds

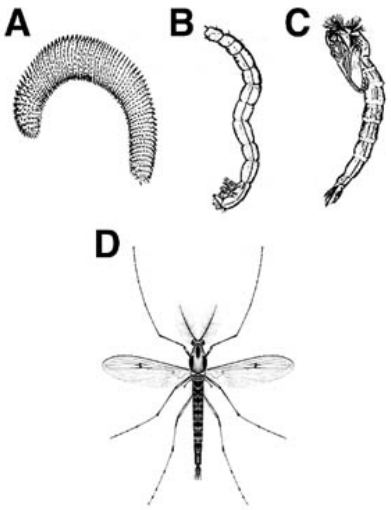




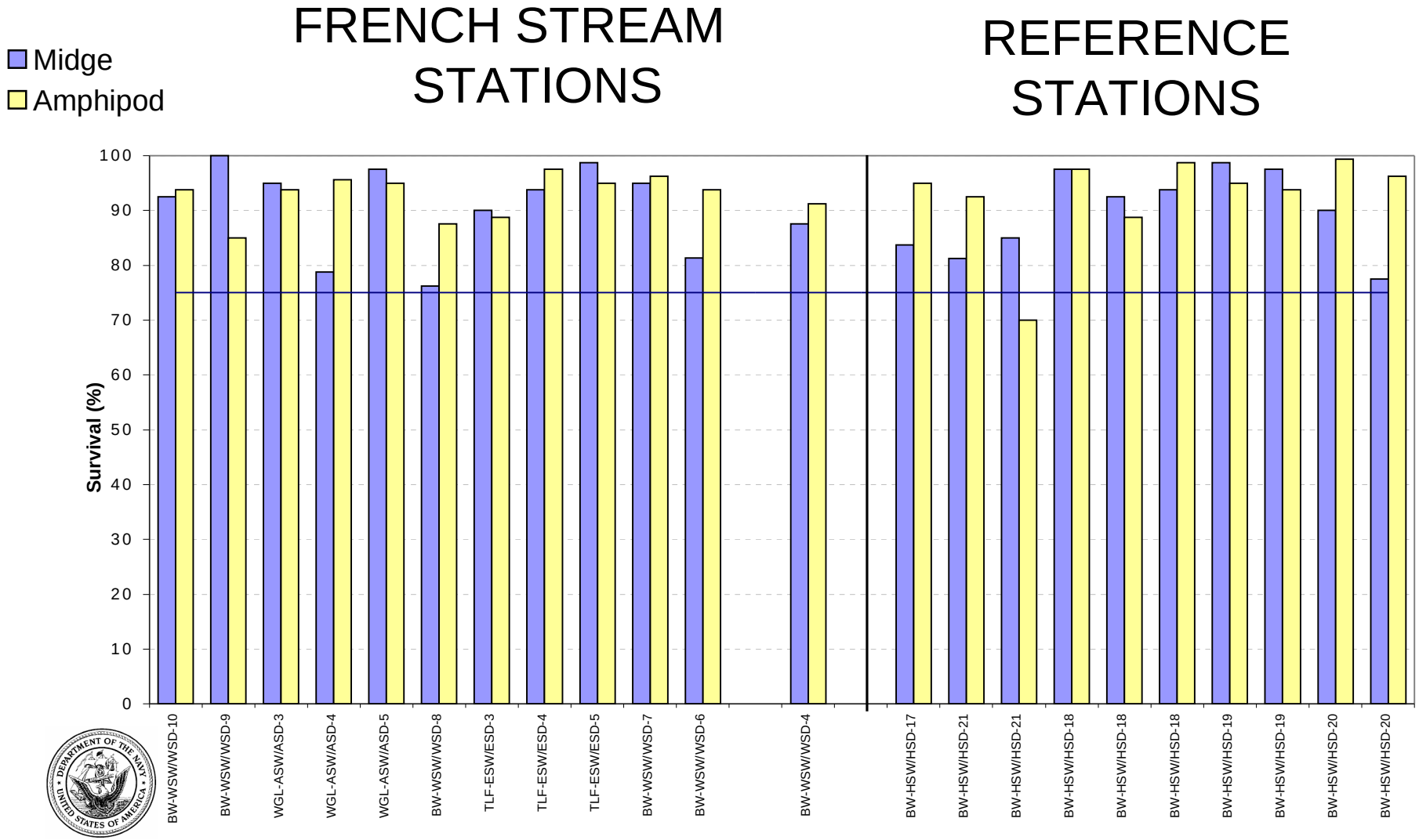
Toxicity Testing

- Twelve stations within French Stream
- Five reference stations
- Two species
  - Amphipod *Hyalella azteca*
  - Midge *Chironomus tentans*
- Survival and growth measured after 10 days
- Evaluate the direct exposure of sediment-dwelling receptors to sediment in the laboratory

Photo by Scott Bauer Available at www.ars.usda.gov

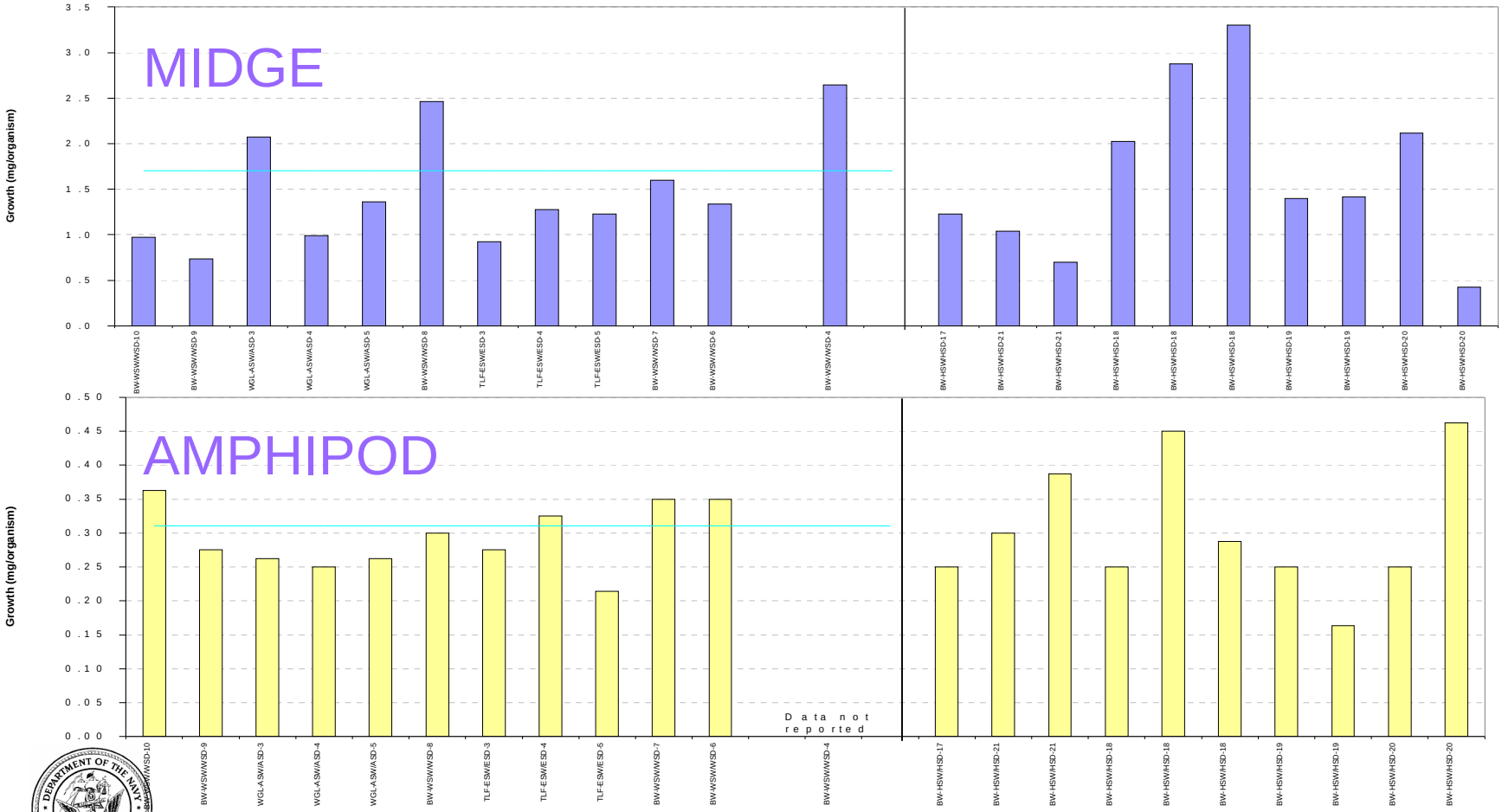


Toxicity Test Results – Survival



Toxicity Test Results – Growth

FRENCH STREAM STATIONS REFERENCE STATIONS



Average for reference stations

Macroinvertebrate Survey Results

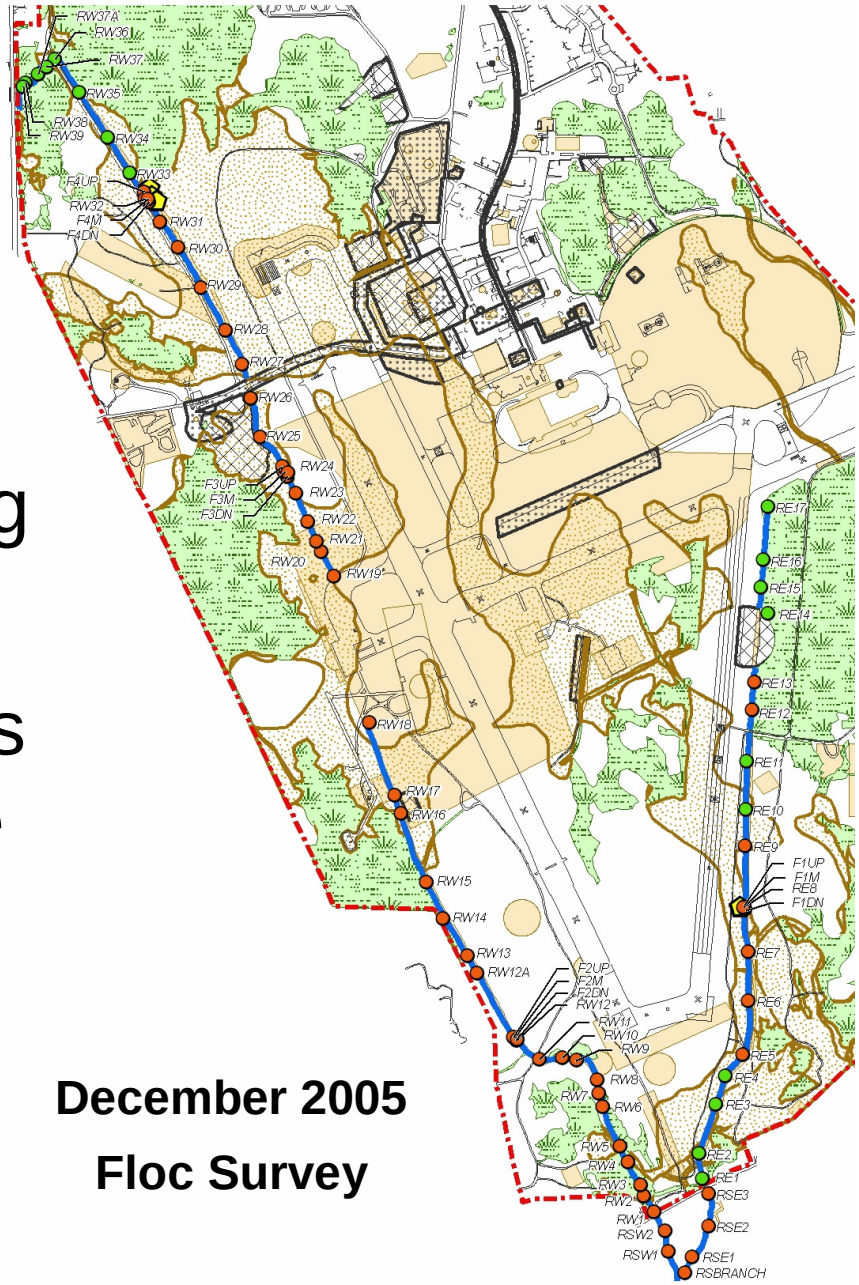
- Seven French Stream stations
- Provide a direct assessment of the benthic community through:
  - Abundance measures
  - Measures of taxonomic diversity and evenness
  - Investigating the association between biological, habitat condition, and chemistry
  - Statistical evaluation of sediment chemistry concentrations and macroinvertebrate metrics

Macroinvertebrate Survey Results

- Survey indicated a moderately stress-tolerant community present throughout French Stream
  - Including at the upstream reference location
- Similar level of impairment throughout French Stream
- Not correlated with a particular chemical in sediment

Floc Survey Results

- Surveys indicated floc present throughout French Stream, including at upstream locations
- Concentrations of metals in floc exceeded surface water benchmarks



December 2005

Floc Survey

Other Endpoints

- Surface water concentrations exceeded benchmarks for selected metals throughout stream
  - Aluminum, barium, copper, iron, zinc
- Concentrations of chemicals measured in tissues were low
  - Similar to tissues collected from reference locations
  - Below tissue concentrations associated with adverse effects
- Statistical evaluation did not identify strong relationships between chemistry, toxicity testing, or macroinvertebrate survey results

French Stream ERA Conclusions

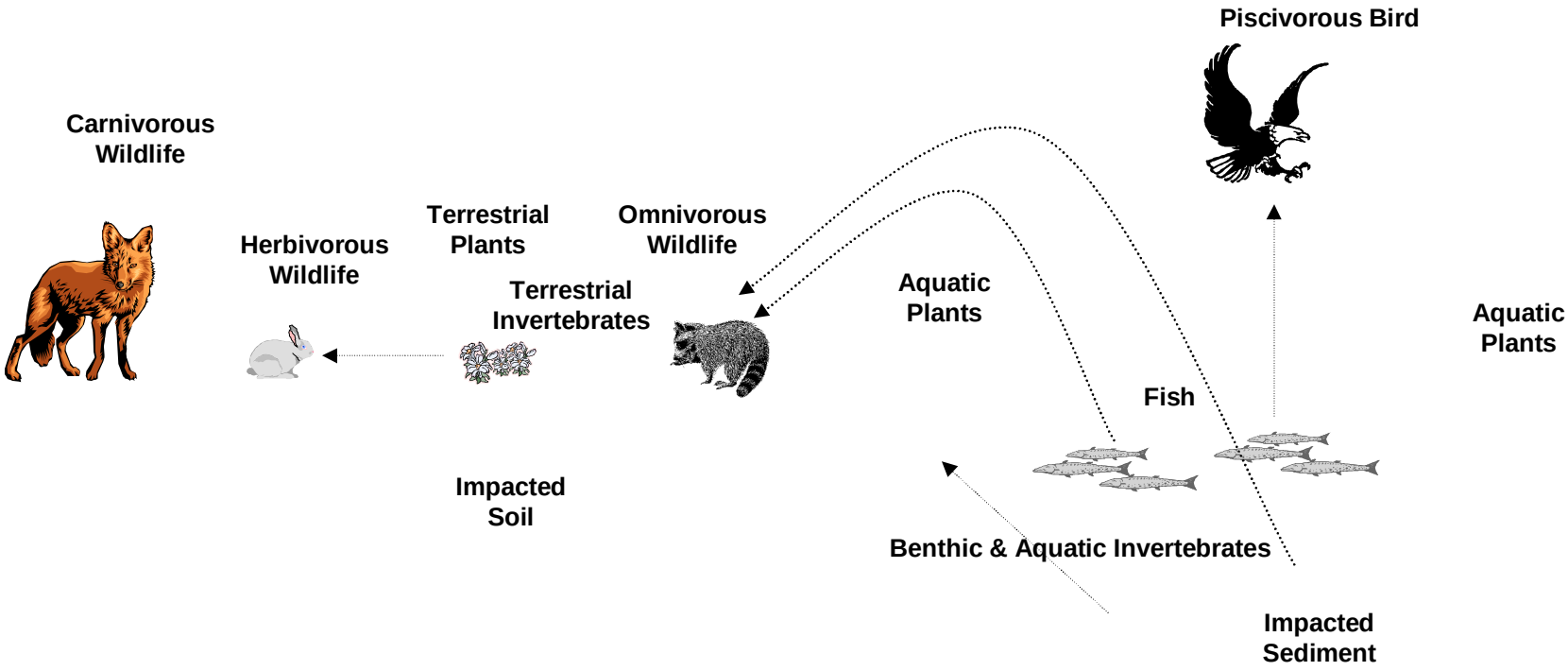
- Potential for adverse impacts to invertebrate, fish, and amphibian receptors in French Stream is low and limited to sub-lethal effects
- No strong relationships between chemistry and slight reductions in growth observed in the toxicity tests
  - Despite variation in sediment concentrations there was no consistent toxicological response
- Iron and manganese (major components of the floc) do not appear to be related to reductions in growth in toxicity tests
- French Stream shows some degree of impairment
  - Impairment does not appear to be related to exposure to chemicals in sediment or water and is generally similar in upstream reaches

Higher Trophic Level ERA

Higher Trophic Level ERA

- Designed to assess potential risks to vertebrate wildlife with large home ranges
  - Focus on carnivores and omnivores
  - Food chain uptake
  - Persistent, bioaccumulative, and toxic chemicals
- Existing chemistry data from range of Navy programs
  - Site-specific tissue residue data available
    - Amphibian, worm, fish, mammal

Conceptual Food Web Model

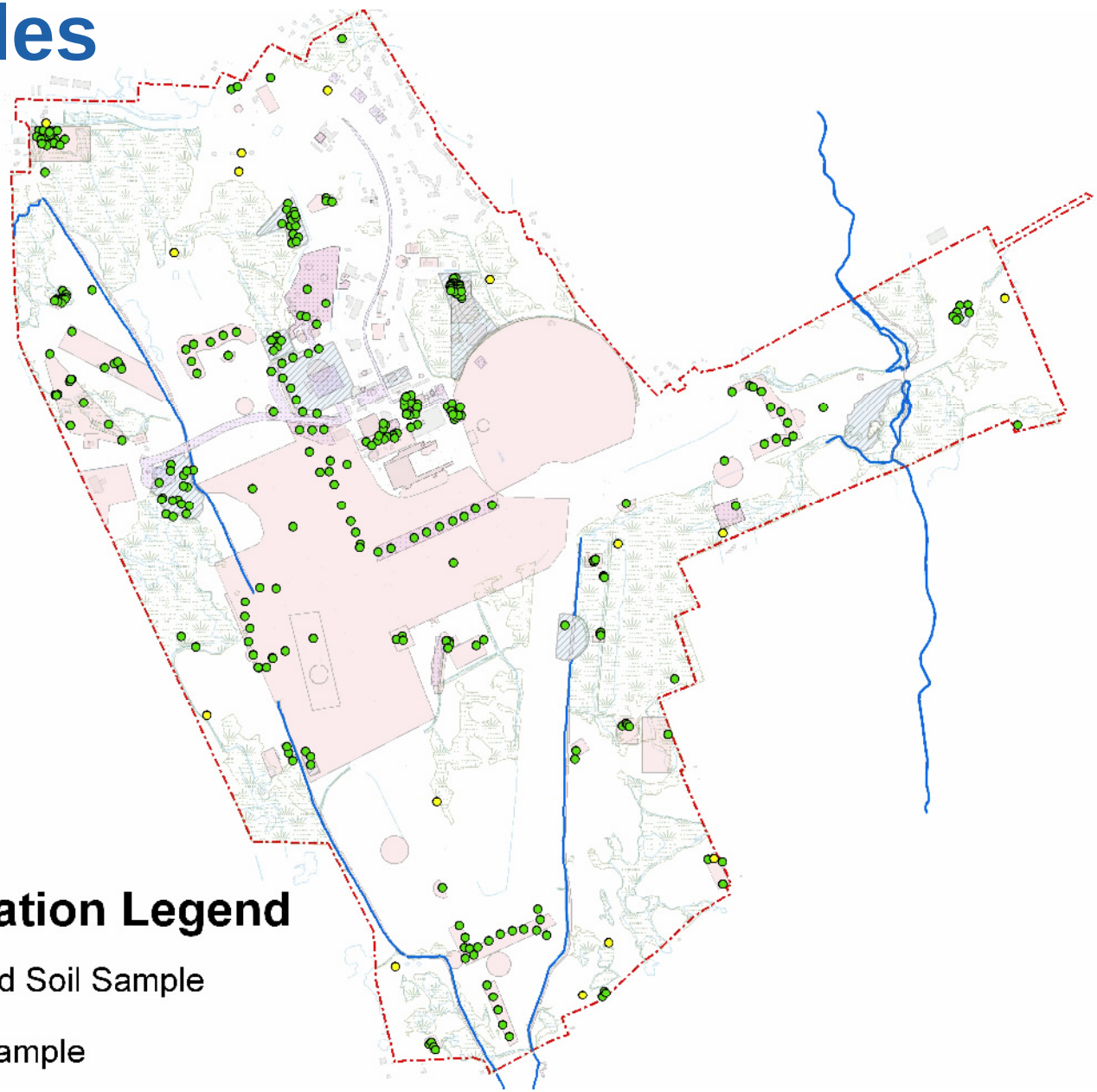


Higher Trophic Level ERA Approach

- Focus on surficial soil, surface water, sediment, and tissue data representing current conditions
- ERA recognized that some of the “hottest” data have been addressed
  - RDA, TACAN, FFTA

	Number of Samples	
Medium	**Basewide**	**Background**
Soil	382	15
Sediment	371	14
Surface Water	248	16
Tissue - amphibian	10	4
Tissue - fish	14	5
Tissue - worm	5	2
Tissue - mammal	7	2

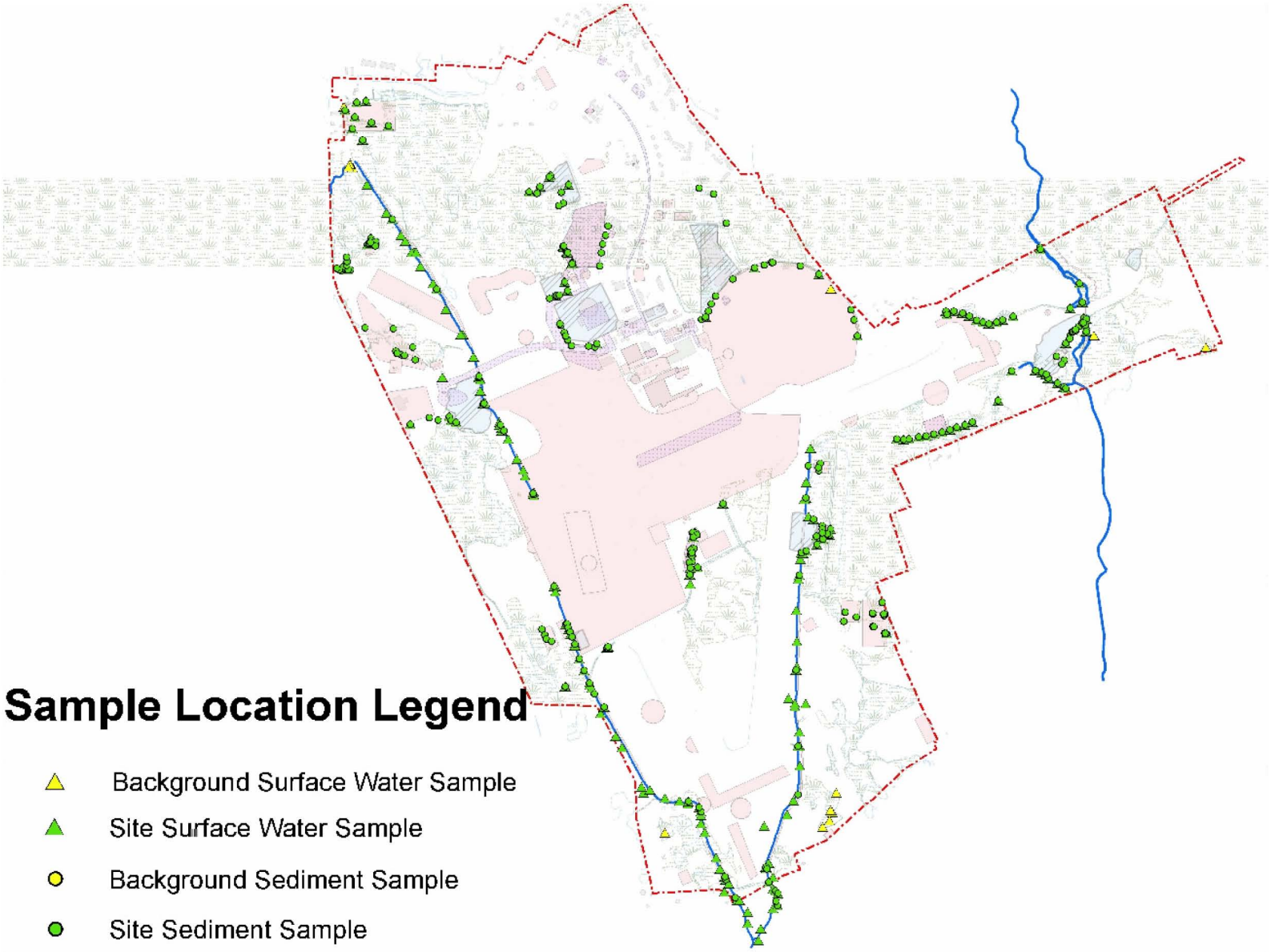
Soil Samples



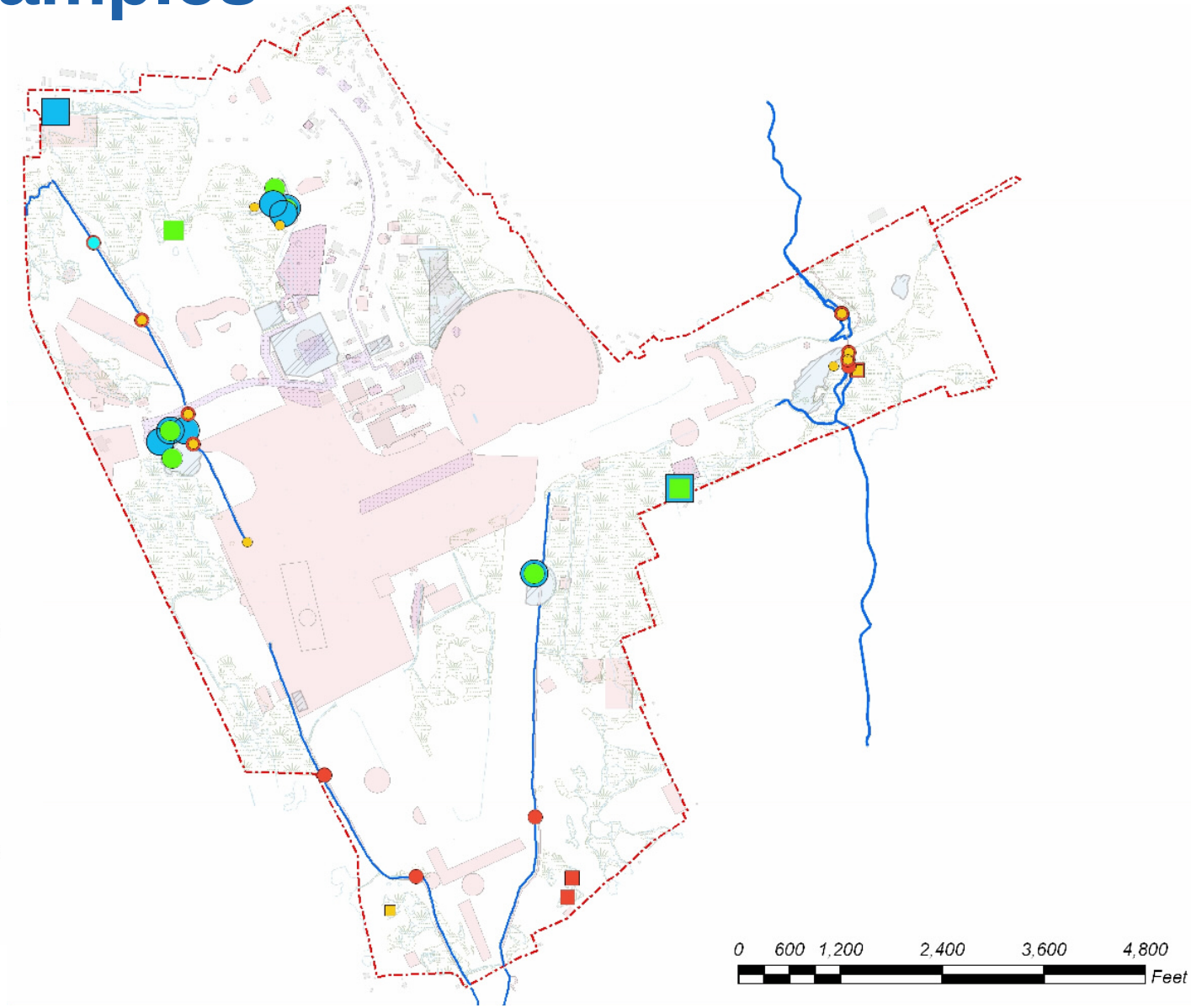
Sample Location Legend

- Background Soil Sample
- Site Soil Sample

Surface Water and Sediment Samples



Tissue Samples



Legend

Site

- amphibian
- fish
- invertebrate
- mammal

Background

- amphibian
- fish
- invertebrate
- mammal

Higher Trophic Level ERA Approach

- Consider maximum and average Basewide and background concentrations
- Model potential daily dose for each chemical and receptor
  - Ingestion of prey items, drinking water, and sediment or soil
- Compare potential daily dose to Toxicity Reference Value
  - No adverse observed effect levels
- Hazard quotient = Potential Daily Dose/TRV
  - HQs < 1 - exposure to a chemical would not be associated with adverse effects
  - HQs >1 - potential for adverse effects to a receptor due to exposure to a chemical

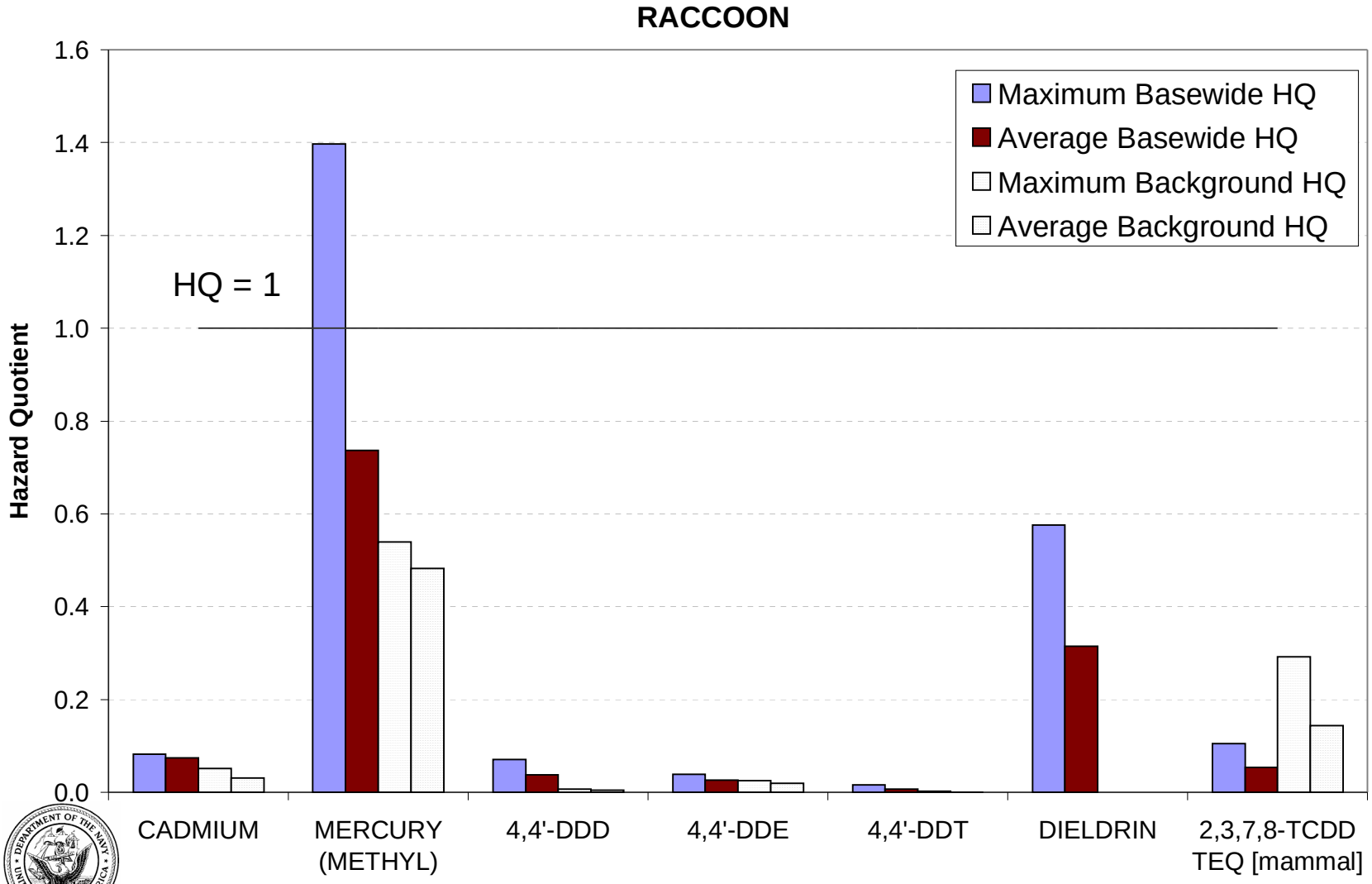
Higher Trophic Level ERA Results

- Of the 18 bioaccumulative compounds evaluated 11 had HQs < 1 for all receptors
- Seven compounds had an HQ > 1 for at least one receptor under maximum exposure scenario

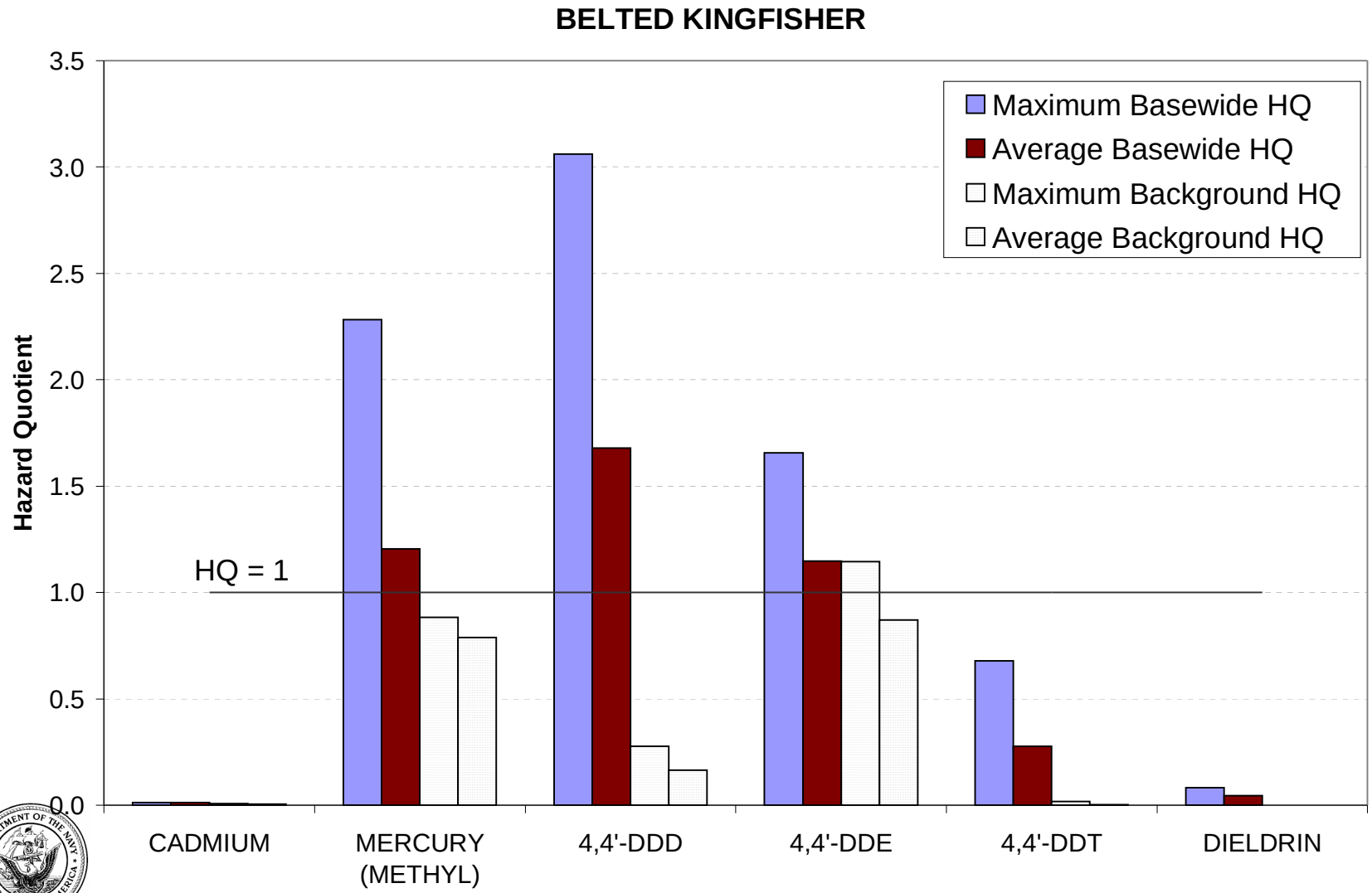
	Hawk	Fox	Coyote	Woodcock	Kingfisher	Raccoon
Cadmium	x	x	x	x		
Methyl mercury					x	x
4,4'-DDD					x	
4,4'-DDE				x	x	
4,4'-DDT				x		
Dieldrin				x		
Dioxins			x			

- Elevated HQs were driven by tissue concentrations
  - not sediment, soil or surface water ingestion
- Elevated HQs were also present at background conditions for some compounds

Higher Trophic Level ERA Results



Higher Trophic Level ERA Results



Higher Trophic Level ERA Results

- HQs > 1 were associated with tissues collected primarily from the WGL and STP and in aquatic areas downstream of the RDA
  - Remedial actions for the WGL and the STP will take place in the near future
  - RDA has been capped
- Following completion of further remedial actions, tissue concentrations will likely be further reduced resulting in lower HQs

Higher Trophic Level ERA Conclusions

- Highly conservative approach
- HQs > 1 were calculated for seven chemicals
  - Background HQs > 1 calculated for cadmium and DDE
- HQs likely to decrease with planned remedial actions
- Potential exposure to chemicals in surface soil, sediment, and surface water is not likely to result in significant adverse impacts
- Ingestion of floc is not likely to result in unacceptable risks (HQs well below 1)

Pathway Forward

- Three Draft Technical Memoranda have been submitted to agencies
  - Geochemical – all agency comments received
  - Hydrogeological – all agency comments received
  - Human Health Risk Assessment
- Two Draft Technical Memoranda to be submitted in August 2007
  - French Stream Ecological Risk Assessment
  - Higher Trophic Level Ecological Risk Assessment
- Navy is awaiting final agency comments on risk assessments
- Revisions to Technical Memoranda to be prepared following receipt of all comments