

Avian Mycobacteriosis Risk Assessment Tool

Version 1.0 Instructions

Welcome! This tool was created to assess the relative risk of transmitting mycobacteriosis to either a captive or reintroduction population via an animal shipment. Avian managers and veterinarians were brought together from several different institutions to gather the most recent scientific information regarding mycobacteriosis and its transmission (see the list of participants at the end of these instructions). It is our hope that both managers and veterinarians will find this tool useful when discussing potential shipments within and between institutions or reintroduction programs. This project was made possible by the generous support of the Conservation Endowment Fund and the Davee Foundation.

Please read all of the instructions below prior to attempting to use the Avian Mycobacteriosis Risk Assessment Tool.

LOADING THE DATABASE

The Avian Mycobacteriosis Risk Assessment Tool was created in Microsoft Access® (see below for Access requirements). In order to start you must download 2 files: "Avian Mycobacteriosis Risk Assessment-Data-Version 1.0.mdb" (Data) & "Avian Mycobacteriosis Risk Assessment-Main-Version 1.0.mdb" (Main). Both files must be downloaded in the same location on either a network or a hard drive. The tool will not work if you try to open it directly from a cd or off the internet. Both files are necessary. The Data file is where all of the data is stored, and the Main file is the actual database that you will use to enter animal information.

MICROSOFT ACCESS® REQUIREMENTS

The "Avian Mycobacteriosis Risk Assessment" program requires a recent version of Microsoft Data Access Components (MDAC). If you are running Microsoft Windows XP, Service Pack 2, you already have version 2.8 installed and therefore you do not need to do the following installation(s) and may proceed to the next section of the instructions. You can determine which version of Windows you are running by right-clicking on your "My Computer" icon on your desktop and choosing "Properties". If you do not have a "My Computer" icon on your computer, you can also get to the same place by going to your "Start" menu. Look for a "Settings" item. Some versions of Windows do not display this item. Then choose "Control Panel". In the "Control Panels" choose the "System" item. If you are not able to find your way to the information, please contact your institution's technical support as the information may have been hidden.

The included MDAC installation programs are designed to install only when they are needed. In some instances, depending on your version of Windows, you will be notified that they will not install and will just prompt you to exit out. In other instances, the program will act like it is installing, but will not do very much because that version or a

newer version is already installed on your computer. In either case, no harm is done. Older versions will not overwrite newer versions' files.

Try first to install the version of MDAC in the "MDAC 2.8 SP 1" folder. "SP" stands for "Service Pack" and means that this is a newer release than the version in the other folder. In the "MDAC 2.8 SP 1" folder you will find only one file (MDAC_TYP.EXE). Double-click on it and follow all the prompts, accepting the defaults for everything. When you are done, you may need to restart your computer. As long as the installation program does not tell you that it could not install, you are done. If it did tell you that it could not install, please try installing the version in the "MDAC 2.8 & Jet Engine 4.0 SP8" folder. In that folder you will find two installation files (Jet40SP8_9xNT.exe and MDAC_TYP.EXE). Double-click on the "Jet40SP8_9xNT.exe" file, follow all the prompts, accepting all the defaults. When done, repeat with the "MDAC_TYP.EXE" file. If this one will not install either, it most likely means that you already have version 2.8 or newer on your computer. Restart your computer if requested. At this point you should be able to use the tool without any trouble.

GETTING STARTED—OPENING THE TOOL

To open the tool you should open the Main file ("Avian Mycobacteriosis Risk Assessment-Main-Version 1.0.mdb"). When you open the file, you will be asked if it is from a trusted source or warned that it could contain viruses. The tool itself is virus free. If you feel uncomfortable, you should run antivirus software on the programs before agreeing to open the file.

If you accidentally open the Data file ("Avian Mycobacteriosis Risk Assessment-Data-Version 1.0.mdb"), you will automatically notify you that you have opened the data file and direct you to the Main file.

USING THE TOOL

Once you open the Main file, you will be able to see the first page of the tool. There are some general instructions that you will need to know before you start to use the tool itself.

1. This form was created for user-friendly data entry. To start you will need to enter the Bird Number and Bird Name at the top of the page before you can answer any of the questions.
2. Each page to be filled out is attached to a tab at the top of the form (do not use the arrows at the bottom of the form—see their use below). There are 12 pages (tabs) that need to be filled out before you can see the “Final Score” tab where you will be able to see the final relative risk score. You must fill out the entire page for each tab before the program will let you go to the next tab. If you skip a question, it will not let you continue. If you do not see a new tab appear at the top of the form, look over the page again to see if you have missed answering a question.
3. The program will work best if you open the program window to fill your computer screen. The pages are set up so that you should be able to see all of the text if the windows are fully opened. You cannot scroll with the mouse wheel to see more on a page (the mouse wheel will bring you to another animal record—see below), and, therefore, fully opening the program and the page will be necessary to fill out the tool.
4. You can use the record selector buttons at the bottom of the page to move between animal records (or to move to a blank form). You can also use the mouse wheel to do this. Therefore, if you use the mouse wheel, you will not be moving a page, but moving to a completely new record (not moving down on a page)
5. You may search for a particular bird by clicking the bird ID or name field and then clicking on the binoculars button in the tool bar at the top.
6. By placing your cursor over red text items in the tool, a box will appear with the definition of that word, the meaning behind a question, or will allow you to link to a website. These are intended to make the tool transparent as to the information needed by the answer.

******It is VERY IMPORTANT to note that this scale is a RELATIVE RISK scale. Although numerical scores do place an animal into a specific risk category, the numbers themselves do not actually mean anything alone. Therefore, it is important to note that these categories are not absolute and the borders between them are not hard lines, but are more “fuzzy grey areas.” All assessments are meant, foremost, to encourage logical, organized discussion between medical and management personnel and between institutions/organizations.******

THE TOOL

These instructions are meant to inform users of the rationale behind each section as it pertains to determining relative risk of transmitting disease between two populations. The diagnostic section of the tool will have more specific instructions.

Source (Tabs Source1- Source4)

The location and management practices from which an individual animal comes can contribute to their relative risk of contracting mycobacteriosis. The questions in this section are meant to determine the level of risk the environment plays for a bird before shipment.

Bird Factors (Questions 1-3)

The health status, age class, and family history can play a role in disease acquisition. Birds that are under a high level of stress from either medical or environmental issues could impact the immune status of an individual. Older and younger individuals are more susceptible to contracting an illness. Additionally, exposure to a sire or dam that was confirmed to be infected with mycobacterium increases the likelihood of prior exposure to the disease and therefore increases risk.

Exhibit Factors (Questions 4-32)

The type of exhibit where a bird lives will also have an impact on the likelihood that a given bird has been exposed to mycobacteriosis. The questions in this section are attempting to determine the risk of a bird exposed to other birds that are suspect or confirmed to have mycobacteriosis. Exposure includes contact with animals (feral or collection animals), soil, exhibit materials/furniture, water, food items, and lighting. All of these items are risk factors for disease presence/spread, and can either contribute or reduce the relative risk of an individual animal depending upon management practices.

Quarantine (Tabs Quarantine1-Quarantine2)

This section is to assess the level of quarantine the individual animal will undergo prior to and/or post shipment. It specifically focuses on the recommendations made in 2004 by AZA which were developed to reduce risk of disease transmission of any kind. These recommendations focus on quarantine facilities, length, personnel, protocols and procedures as well as taxon specific guidelines. One addition to the quarantine section that is unique to this situation/issue is the emphasis on disinfection using a tuberculocidal agent.

Diagnostic Testing

Diagnosis of mycobacteriosis is difficult in an apparently healthy, carrier bird. No ante mortem test has been validated for all bird species. The current diagnostic “gold standard” is a positive mycobacterium culture of a lesion. Because culturing requires an extreme amount of time (8-12 weeks) as well as the presence of a defined lesion, a “true positive” is often associated with an obviously unhealthy bird that would not be shipped—these are the “easy ones.” This tool broadens the focus of the assessment to include those birds that are not obviously positive and are potential carriers of the disease. Due to the limitations of available diagnostic tests, an approach based upon cumulative evidence was incorporated into this process. Therefore, a single negative test or risk factor does not necessarily mean that there is “no risk”, but cumulative negative tests or risk factors reduce the index of suspicion and therefore the likelihood that the bird is a carrier. In this light, this tool helps users evaluate the maximum available body of evidence for a given bird shipment to determine overall risk in a more holistic way.

Advanced (i.e., molecular) testing for mycobacteriosis is under investigation/validation in many laboratories. Therefore, the Diagnostic Testing section of this tool only incorporates those avenues reliably and routinely available to all institutions for all shipments. Until proper documentation of the validity of new tests is available and widely accepted, they will not be incorporated into the testing scheme presented here.

Although most of this tool is focused on indirect, although specific, knowledge of the husbandry and management conditions under which the bird to be shipped lives, the Diagnostic Testing section focuses on direct information obtained from the bird itself through medical test results. The diagnostic flow chart (shortcut on the top right side of the screen as a blue box with a flowchart symbol) contains a suggested diagnostic test decision tree created by the diagnostic working group. As in other sections, a maximum risk score is assessed when mycobacteriosis infection is confirmed definitively. In addition, as this tool was designed to conservatively address risk, the absence of information also results in substantial “assumed” risk and is scored accordingly.

Although all birds should have some degree of diagnostic testing, **smaller birds** are not always evaluated to the same extent as others, due to concerns of handling. When a test is not completed, full risk is assigned (since it is impossible to determine what the results of that test might have been). In the case of small birds, this will most likely result in the individuals being in a higher risk category by default. As above, the absence of information results in uncertainty and assumes higher risk. It is up to individual institutions to interpret these results accordingly.

There are two sections in the Diagnostic section: Initial Assessment (Question #38) and Additional Assessments (Question #39). The Initial Assessment (#38) section should be completed for all birds over 60 gm, such as Micronesian kingfisher (*Halcyon cinnamomina*). This section should be completed in consultation with a veterinarian. The initial assessment can be seen as the first diagnostic screening level and determines the recommendations for further testing – or not. If, upon Initial Assessment, the risk exceeds a specific threshold, the user is directed into an Additional Assessments (#39)

area where further testing is highly recommended. If the screening score is below the threshold, additional testing may still be useful as further evidence only clarifies risk. Each institution should determine their level of comfort for more invasive testing on a case by case basis. Completion of the tool as a part of every transfer will standardize the approach to assessing and minimizing risk of disease transmission.

Selection of a qualified laboratory is important for consistency of test quality and interpretation. Although most laboratories provide the Initial Assessment tests, other tests may only be performed in reference/specialty laboratories.

Below is a step by step explanation of the questions to permit the manager and veterinarians of all experience levels to communicate more easily.

Initial Assessment (#38)

38) Minimal screening consists of baseline diagnostic testing that should be completed on all birds which includes physical examination, hematology, fecal acid-fast staining, and radiography.

Yes – if any part of the testing profile is completed – go to 39A-E

No – absence of information assumes full risk, Additional Assessments (#39) will always be strongly recommended in the absence of initial screening information

38A) Physical examination is a thorough hands-on examination of the individual bird which provides substantial support for a truly healthy bird.

38Ai) Unthrifty feather condition that is not associated with known behavioral issues is reflective of an overall poor health status.

38Aii) Weight \leq 70% of normal species range is reflective of a catabolic (excessive energy use) process, which is often an underlying disease. It is important that species normals be used, as a healthy, but overweight, bird may be reduced in body weight from its normal weight but not be reflective of an underlying health concern.

38Aiii) Severe reduction in pectoral (flight) musculature at the keel (Ritchie B, Harrison GJ, Harrison LR, eds. *Avian Medicine: Principles and Application*, 2nd ed. Lake Worth, FL: Wingers Publishing; 1994: 168) is supportive of a catabolic (excessive energy use) process. As fat stores are consumed when muscle wasting occurs, it is suggestive of a more severe disease process.

38Aiv) Mycobacteriosis selectively affects skeletal tissues and can create palpable masses. This may be perceived as swellings of the bone or associated soft tissues. Mycobacteriosis can produce abscesses (chronically infected nodules of soft tissues).

38Av) Mycobacteriosis prefers infecting the liver or producing internal abscesses (chronically infected nodules of soft tissues) which can be assessed as distension of the coelom (abdomen) in the area between the keel and cloaca.

38B) Complete blood count (CBC or hemogram) generally required 0.25ml of heparinized whole blood. At appropriate collection rates of 1% of total body weight of a healthy adult bird, one weighing as little as 25 gm can be evaluated with a hemogram.

38Bi) Anemia is reduction of red blood cell (RBC) mass and reflective of chronic illness. Hematocrit (HCT) is the usual focus for this parameter although total RBC number can be examined against reference ranges also. Regardless of the choice of evaluation, 39Bi should be completed to characterize the clinical value.

38Bii) Leukocytosis (elevated total number of white blood cells, WBC), particularly as elevated absolute numbers of heterophils, is one of the most supportive clinical factors when evaluating for mycobacteriosis. Using species normals is important, although WBC counts over 50,000 should be characterized at least as moderate leukocytosis. It is important to recognize that stress, such as handling, can induce an artifactual leukocytosis so a repeated evaluation to confirm this finding is important.

Depending on the size of the bird, this test can be repeated within 24 hours (weight greater than 250 gm) or one week (weight less than 250 gm).

38Biii) Monocytosis is reflective of a particular white blood cell (monocyte) increase that is active in chronic infections, such as mycobacteriosis. This is a more subjective or individually present finding so is characterized as present or not, against species normal ranges.

38Biv) Toxic white blood cells are reflective of damage to these cells during formation in the bone marrow and supportive of systemic disease. This is a more subjective or individually present finding so is characterized as present or not, against species normal ranges.

38Bv) Fibrinogen is a blood protein that is increased in chronic infections, such as mycobacteriosis. This is a more subjective or individually present finding so is characterized as present or not, against species normal ranges.

38C) Serum or plasma (blood with red blood cells removed) chemistries require a minimum volume of 0.2-0.5 ml, depending on the laboratory. As blood cells compose approximately 30-50% of blood volume, blood must be collected at roughly twice the expected plasma (serum) needs. Additionally, it must be

reminded that 0.25 ml of blood was collected for the preceding item (hemogram). Therefore, at appropriate collection rates of 1% of total body weight of a healthy adult bird, one weighing as little as 60 gm can provide a total sample volume to assess both a hemogram and full chemistry panel. Even in a situation where the bird is too small to collect this full information, full risk is assigned, as unknown status equates to higher risk.

38Ci) Globulin is blood protein that is increased in chronic infections, such as mycobacteriosis. This is a more subjective or individually present finding so is characterized as present or not, against species normal ranges.

38Cii) Albumin is blood protein produced by the liver. In situations of hepatic (liver) mycobacterial infection, the liver is unable to produce sufficient albumin and the amount in the blood declines. This is a more subjective or individually present finding so is characterized as present or not, against species normal ranges.

38Ciii) Electrophoretograms (EPH) is a protein profile of the plasma which can detect relative changes of protein concentrations and be supportive of active or chronic infection. This is a more subjective or individually present finding so is characterized as present or not, against laboratory normal ranges.

38Civ) Aspartate transaminase (AST) is an enzyme contained within hepatic (liver) cells. When these cells are damaged, the enzyme is released into the circulating blood in increased quantity. Elevation of this enzyme is supportive of hepatic (liver) disease as can occur with mycobacteriosis.

38Cv) Creatine phosphokinase (CK) is an enzyme contained within muscle cells. When these cells are damaged or wasted due to catabolic (excessive energy use) processes, the enzyme is released into the circulating blood in increased quantity.

38Cvi) Glutamate dehydrogenase (GLDH) is an enzyme contained within hepatic (liver) cells. When these cells are damaged, the enzyme is released into the circulating blood in increased quantity. Elevation of this enzyme is supportive of hepatic (liver) disease as can occur with mycobacteriosis.

38Cvii) Bile acids are produced by the liver and stored in the gall bladder. In situation of hepatic (liver) mycobacterial infection, the liver is unable to re-circulate sufficient bile acids and the amount in the blood increases.

38D) Acid-fast staining is specific to the cell wall of very few bacteria, classically mycobacteria. It is a specific technique and interpretation that requires an experienced technician.

38Di) In birds, mycobacteria is circulated through the gastrointestinal tract so feces can serve as an easily obtained, non-invasive sample to screen.

38Dii) However, mycobacteria is intermittently shed so a repeated test within a week can lend support to an increased risk. It is important to recognize that a negative acid fast stain - even repeated – is not confirmatory of negative mycobacterial status due to small numbers of organisms, so culture of feces (Additional Assessments) is further important information.

38E) Diagnostic imaging requires experienced interpretation, available directly from standard literature or consulting with an experienced clinician. Radiographs are the most readily available imaging in any setting and for any size bird. It is important to properly position the bird (see redline) to provide optimal images.

38Ei) Hepatomegaly is an enlarged liver which is reflective of hepatic (liver) disease and suggestive of mycobacteriosis due to its predilection for this site.

38Eii) Mycobacteria preferentially infected skeletal tissues. This can produce osteolysis (punched out lesions in the bones) which should not be confused with the normally air-filled bones of the avian skeleton, specifically humerus and femur. Additionally, mycobacteria bone infection can produce skeletal nodules (proliferation) or fractures due to weakened bones.

38Eiii) Splenomegaly is an enlarged spleen which is reflective of spleen disease and suggestive of mycobacteriosis due to its site of infection in a filtering organ.

38Eiv) Mycobacteriosis can produce abscesses, granulomas, or other organ enlargement within the abdomen (coelom) that can be visualized in a radiograph.

At the conclusion of the Initial Assessments (#38), the user will be prompted to consider Additional Assessments (#39).

When the Initial Assessment results in a low level of relative risk, no further testing is specifically recommended. Additional Assessment testing may be recommended at the attending veterinarian's discretion based on the bird's history, transfer proposed, and specific Initial Assessment results.

When the Initial Assessment is associated with a high level of relative risk, it is strongly recommended that Additional Assessment testing be completed.

Additional Assessment (#39)

Selection of a laboratory for completing these tests is important for consistency and experience with interpretation. It is particularly important in these Additional Assessments that a laboratory experienced in culture, staining, and interpretation for mycobacteria is utilized.

39A) Culture is the gold standard for diagnosis of mycobacteriosis.

39Ai) In birds, mycobacteria is circulated through the gastrointestinal tract so feces can serve as an easily obtained, non-invasive sample to submit for culture.

39Aii) Hepatic (liver) tissue is the primary filtering organ for the gastrointestinal tract where mycobacteria in birds is typically circulated. Although invasive, a hepatic (liver) biopsy is an important screening sample for culture of mycobacteriosis in the clinically healthy bird.

39Aiii) Specific lesions in other tissues can be an important culture sample for mycobacteriosis.

39B) Whenever a sample is collected for culture (39A) or pathology (39E), it is an important screen to use baseline cytology (cell profile).

39Bi) Hepatic (liver) tissue is the primary filtering organ for the gastrointestinal tract where mycobacteria in birds is typically circulated. Although invasive, a hepatic (liver) biopsy is an important screening sample of mycobacteriosis in the clinically healthy bird which can be examined by standard cell stains (Dif-Quik).

39Bii) Hepatic (liver) tissue is the primary filtering organ for the gastrointestinal tract where mycobacteria in birds is typically circulated. Although invasive, a hepatic (liver) biopsy is an important screening sample of mycobacteriosis in the clinically healthy bird which can be examined by mycobacterial specific cell stains (acid fast).

39Aiii) Specific lesions in other tissues can be an important sample for mycobacteriosis that can be examined by standard cell stains (Dif-Quik).

39Aiv) Specific lesions in other tissues can be an important sample for mycobacteriosis that can be examined by mycobacterial specific cell stains (acid fast).

39C) Ultrasound is the most routinely available of the advanced diagnostic imaging, although computed tomography (CT) or magnetic resonance imaging (MRI) would similarly fall into the advanced imaging category. Experienced

interpretation available directly from standard literature or consulting with an experienced clinician is essential to provide optimal images.

39Ci) Hepatic (liver) echotexture (appearance as an ultrasound) should be considered against known standards.

39Cii) Imaging can be used to detect other organ enlargement or abscess development within the coelom (abdomen).

39D) When a bird is surgically evaluated, it is important to evaluate both sides of the coelom (abdomen) whenever possible. Mycobacteriosis is not consistently a diffuse (widespread) or symmetric (present on both sides) disease so a false negative can occur when only one side is evaluated.

In surgery techniques, laparoscopy is a less invasive process with a reduced entry wound but can have a limited view; it is useful in birds as small as 30 gm. Laparotomy is full surgical exposure of the coelom (abdomen) but can be performed in any size bird. Typically, laparotomy should be performed with the intent to collect samples for culture (39A), cytology (39B), culture, and pathology (39C).

39E) Aside from culture, pathology is the best technique to directly analyze tissues for presence of mycobacteria or the lesions produced. Pathology can also identify other explanations for the clinical signs consistent with mycobacteriosis, such as hepatomegaly (liver enlargement) produced by amyloidosis or skeletal lesions produced by metabolic bone disease.

39Ei) Hepatic (liver) tissue is the primary filtering organ for the gastrointestinal tract where mycobacteria in birds is typically circulated. Although invasive, a hepatic (liver) biopsy is an important screening sample which can be examined for acid-fast organisms.

39Eii) Hepatic (liver) tissue is the primary filtering organ for the gastrointestinal tract where mycobacteria in birds is typically circulated. Although invasive, a hepatic (liver) biopsy is an important screening sample which can be examined for signs of granulomatous (chronic inflammation) infiltrate.

39Eiii) Specific samples from other tissues can be an important for mycobacteriosis that can be examined for acid-fast organisms.

39Eiv) Specific samples from other tissues can be an important for mycobacteriosis which can be examined for signs of granulomatous (chronic inflammation) infiltrate.

At the conclusion of the Diagnostic Testing portion of the tool, the diagnostic score should be reviewed. Considerations that may reduce risk include:

- a) completing omitted tests;
- b) repeating the tests in both pre-shipment and quarantine periods;
- c) extending the quarantine period to permit re-testing;
- d) returning the bird to its point of origin.

Shipment (Questions 40-44)

The shipping process can increase both exposure to and expression of disease. For example, there is risk of a bird being exposed to other animals when passing through international quarantine. Exposure to temperature extremes during the shipping process may increase stress and result in disease.

Destination (Questions 45-48)

Once the bird arrives at another institution, there are ways to reduce risk through post-shipment quarantine/isolation, following recommendations for an AZA program, and using IUCN guidelines for reintroduction programs. Additionally, if there is a confirmed case of mycobacteriosis in the recipient population, than the risk of introducing mycobacteriosis is dramatically reduced.

Final Score

The final score page will show you the score you received on each of the sections (Source, Quarantine, Diagnostic Testing, Shipment, and Destination sections). While you were unable to see the score each individual question gave you when the tool was filled out, you may check the “Display Individual Scores for this Bird” box to see each score when you go back through the tool. This is meant to help you know which tests or management strategies will help you to reduce the level of risk for your shipment.

It will also give you a total score which will put you into one of the relative risk categories: red, yellow, or green.

RED (Score of 256+)

This risk category represents the highest relative level of risk. In this case, the move is not currently recommended without implementing additional risk reducing measures. These may be in the form of additional diagnostic test results, an additional quarantine period, or different management strategies at the shipping or receiving institution. Relatively, an animal with this score is most likely to spread mycobacteriosis.

YELLOW (Score from 76-255)

This risk category represents a medium level of risk. In this case, there is evidence that this animal has been exposed to, or is shedding, mycobacteria into the environment. Positive diagnostic screening test results, history of exposure to known positive birds or a contaminated enclosure could result in “medium risk”. In this category, managers and medical experts at both institutions/sites should

strongly consider gathering additional evidence, or taking strong management measures before initiating transfer.

GREEN (Score below 75)

This risk category represents relatively low risk. In this case, there is not much evidence, medical or husbandry, to suggest that this transfer would result in a risk of spreading mycobacteriosis.

Also on this page is the ability to see a “Report”. By clicking on the report button on this page, a new page will open and give you a report showing the entire report (with points) for the shipment. This report can be emailed to share with another institution or individual. In order to email the Report you will need to click on “File” then “Send to” and “Attach to an email.” It will then ask what type of format you would prefer. You must choose to send it in Snapshot Format in order for all of the questions to appear in an email attachment. It can also be printed by clicking the printer icon just above the report. To exit from the “Report” page, please click on the “Close” button just above the report itself (not the “x” in the top right hand corner as that will close the program entirely). Three examples of the report have been included in this cd. They include an example of a bird that is in each of the risk categories (green, yellow, and red).

We hope that this tool assists your institution in making informed decisions about future bird shipments and their relative risk to introducing *Mycobacterium* to a population. Should you have any questions regarding this tool, please contact either Dr. Kathryn Gamble (kgamble@lpzoo.org) or Dr. Megan Ross (mross@lpzoo.org).

Users of this tool are encouraged to send completed reports to either the veterinary coordinators of this tool (kgamble@lpzoo.org or dtravis@lpzoo.org) or the Veterinary Advisors (<http://www.aazv.org/ssptagvetadvisors.htm>) of the particular taxa to permit continued evaluation and evolution of the information base about avian mycobacteriosis.

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Happy shipping and may we all be as *Mycobacterium*-free as possible!