CONFERENCE / WORK TRAVEL REPORT FOR:

TITLE: Application of Environmental Effect Monitoring Tools to Investigate Fish Mortality in the São Francisco River, Brazil

LOCATION: Três Marias, Brazil

DATES: September 27 to October 7, 2005

| Prepared by: | Name: | Vince Palace |
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| | Work Location: | Habitat Impacts Research Section |
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Objectives:

The World Fisheries Trust is a non-profit organization, established in 1994 to promote sustainable use of global fisheries resources. They provide research, public awareness and training in partnership with agencies, governments, communities and academia in order to develop methods and policies to ensure continued livelihood from fisheries. WFT contacted Dr. Palace and Ms. Lisa Peters (University of New Brunswick) to become involved in both research and advisory capacities to investigate cumulative impacts of industry, pesticides and sewage releases on a native fishery resource on the São Francisco River in Brazil. Specific objectives for the travel were:

- 1) raise the profile of prior work funded by the Department,
- 2) gain valuable information experience in applying risk-based models to fishery resources as they apply to use of those resources for artesanal and subsistence fisheries (ie. the communities in which these assessments will occur depend almost entirely on the fish stocks for their livelihood)
- 3) gain additional information regarding the cumulative impacts of multiple contaminant releases on fishery resources within a riverine environment

Overview:

Dr. Palace and Ms. Peters attended a multi-stakeholder meeting entitled "*Redução de Impactos Ambientais na Bacia do Alto/Medio Rio São Francisco*" in Três Marias, a village of approximately 30,000 located in the state of Minas Gerais, Brazil on September 29 and 30. The meeting brought together scientists from Brazil as well as fishermen, environmental regulators, environmental interest groups and industry to examine information related to recent mortality of fish in the region of the São Francisco River surrounding Três Marias. WFT has begun a scientific investigation into the cause of these fish kills with the community and Dr. Palace and Ms. Peters were asked to participate to give the Canadian perspective on examining both point source contamination form sewage and industrial metal release as well as the cumulative impacts of these stressors as well as potential pesticide influences. Dr. Palace delivered a

presentation (that was simultaneously translated to Portuguese) at the meeting detailing the methodologies of fish surveys using EEM approaches and the benefits of employing small-bodied fish for monitoring purposes. Until now, all parties, including the WFT, has used larger-bodied fish for investigations. More certain exposure due to lower mobility, access to larger sample sizes and sites, shorter reproductive cycles and better public perception were all provided as rationale by Dr. Palace and Ms. Peters for the use of small-bodied fish.

Between October 1 and October 6, Dr. Palace also led a team of investigators and fishermen to collect small bodied fish from 5 sites within the São Francisco drainage below the Três Marias reservoir. These sites were chosen because of their exposure to metals, sewage, pesticides, and cumulative impacts from all of these stressors or as reference sites. Samples of organs and whole fish will be shipped to Dr. Palace's laboratory in Canada for analysis of specific effects arising from each of the stressors identified. Dr. Palace and Ms. Peters will provide this information, in a timely manner, to the WFT to aid in their investigations. Finally, technologies will be transferred to Brazilian regulators and academics so that further monitoring can continue.

Conclusion / Benefits to DFO:

Dr. Palace's research program has been developing new technologies for use in EEM programs in Canada for the past 6 years. Part of these activities has been the development of the use of small-bodied fish and caged small-bodied fish for investigating effects of effluents, and pesticides on fish health and reproduction. Some criticisms to using this approach have included the site specific nature of the data that is generated. By applying the same techniques to a completely different situation and ecosystem, Dr. Palace aims to provide evidence that different systems can indeed be investigated by using standardized small-bodied fish methodologies. Application of the methods to the Brazilian situation has a number of benefits to Canada and DFO. Dr. Palace has met with several key players in the investigation and has attempted to foster a short-term collaboration. These include Dr. Yoshimi Sato of the CODEVASF (Companhia de Desenvolvimento do Vale do São Francisco) fisheries research station in Três Marias, , which has holding and rearing facilities for small-bodied fish that can be used in future caging experiments on the São Francisco River. Dr. Hugo Godinho, senior researcher at the Pontificary University of Minas Geraisin Belo Horizonte (PUC-Minas) and co-workers are also keen to collaborate and to develop a program of technology transfer. Specifically, Dr. Palace is seeking to embark on a caging investigation into potential effects of the separate and cumulative impacts of contaminant releases on native small bodied fish in the São Francisco River. Fish would be caged at several sites on the river. Investigation of effects would be accomplished using DFO, PUC-Minas, CODEVASF, and other Brazilian collaborators. Ultimately, technology would be transferred from Brazilian researchers to DFO and from DFO to Brazilian laboratories. Data and techniques arising from the application of EEM techniques to the São Francisco would be used to determine their potential applicability to Canadian investigations.

Note: Travel and accommodation paid for by WFT under their existing CIDA grant.