Introduced and translocated fishes: a view from the southern hemisphere

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The environment is a dominant issue in all aspects of life including the political arena. For instance, I just received a pamphlet through my front door from a candidate in a local municipal election proclaiming 'for our environment'. Even though fish biologists often think of themselves as objective professionals, they too have become caught up in the conservation movement. Nowhere is this more apparent than in the increased concern of the effects of introduced fishes on native fishes and their habitats. This is illustrated by the number of conferences and workshops recently devoted to this subject. The present volume is devoted to the proceedings of one such workshop held on 24 and 25 August 1989 at Magnetic Island, Queensland, Australia.

In the preface the reader is introduced to the three objectives of the workshop. These were to (1) discuss the ecological effects of introduced and translocated fishes on indigenous aquatic fauna and habitats in the Australian region, (2) discuss the ecological implications of proposed fish introductions and translocations to the Sepik River system of Papua New Guinea and (3) consider recommendations in relation to possible future research on the problems identified in the first two objectives. Upon considering these objectives, the temptation is to become cynical and conclude that these proceedings are not likely to present anything fundamentally new. Although the many conferences and workshops of this type have an abundance of discussion and recommendations, few have provided evidence that the recommendations will be heeded and action will follow.

D.A. Pollard's introduction to the workshop shows that such a defeatist attitude is unwarranted; two resolutions passed by the Australian Society for Fish Biology's Annual General Meeting in 1985 highlight important successes regarding fish introductions in the region. The first resolution questioned the introduction of non-indigenous fish species to Papua New Guinea and offered to participate in the development of programmes to increase the productivity of native fishes. This resolution later resulted in a request to the Society for advice and assistance in relation to the general issue of fish introductions and contributed to the current stock enhancement project in the Sepik River as discussed below. A second resolution contributed to the Queensland State Government's decision not to introduce Nile perch, *Lates niloticus*, from Africa to northern Australia. This decision was based on observed impacts in Lake Victoria and Lake Kyoga (Barel et al. 1985) and consideration of Nile perch biology in relation to Australian environmental conditions. As Barlow and Rodgers stated in the current volume, this highlighted the need for a systematic approach to evaluating proposals for introductions (Kohler & Stanley 1984, Turner 1988).

This volume, like many others of its kind suffers from huge variation in the quality of the presentations. The papers range from general summary statements of ideas to detailed studies of specific
systems. Some of the case studies are important because they give valuable lessons and provide the data and ammunition necessary to convince politicians that introduced fishes are of significance. For example, Burchmore, Faragher & Thorncraft documented the widespread distribution of introduced Oriental weather loach *Misgurnus anguillicaudatus* in the Wingecarribee River, New South Wales. Their work illustrates how quickly introduced species can become established and the difficulties in eradicating them after introduction. These data show that prevention is a preferred approach. Lintermans, Rutzou and Kukolic’s paper on introduced fish of the Canberra Region raised concerns on the impact of introduced redfin (perch), *Perca fluviatilis*, from Europe on native species. They suggested that the three main problems associated with the spread of redfin are: competitive and predatory interactions with native and stocked fishes and introduction of disease. Such concerns have become reality through the introduction of four native Australian fishes into Lake Eacham, a small crater lake on the Atherton Tableland in northern Queensland as described by Barlow. The stocked species were indigenous to the region around Lake Eacham but not to the lake itself. The rainbowfish declined rapidly as the populations of introduced species increased. In fact, a survey failed to find the endemic Lake Eacham rainbowfish, *Melanotaenia eachamensis*, soon after these introductions. Fortunately, some aquarium specimens could be used to establish a pond-breeding population as a basis for conserving this species. However, it will be difficult to reestablish rainbowfish in Lake Eacham because it is considered virtually impossible to eliminate the introduced fishes prior to restocking. An alternative is to introduce Lake Eacham rainbowfish into other sites. This leads to a second potential problem, however, because all suitable sites contain a second closely related indigenous species of rainbowfish, *Melanotaenia splendida*, and the impact on this taxon is unknown.

The paper by Bluhdorn, Arthington and Mather has taken a broader view and goes beyond description of specific systems by evaluating and providing concrete and realistic recommendations regarding the introduced cichlid *Oreochromis mossambicus*. They began by describing the distribution of the species and then use genetic methods to establish that genetically distinct forms exist in Australia. The genetic data illustrate the severity of the problem in that multiple introductions and releases of different stocks have been made into Australia. The authors then provide baseline data on somatic characteristics such as stunting, diet and resource sharing with native species. Most importantly, they synthesize these data to formulate a management plan for Australia and finally identify research needs. Other papers, however, do little to provide the reader with an innovative approach to the problem of fish introductions. Although they are of significance within a local context, they contribute little to an overall synthesis of the big picture. This could largely have been avoided as modifications in presentation style would have increased the impact of these data. Other papers fall into the opposite extreme; much of their content is not original as they echo the impassioned pleas of others. They do, however, bring important information to the attention of the Australian audience.

The descriptions and discussion of proposed introductions to the Sepik River, Papua New Guinea is a particularly interesting feature of this volume. The relatively impoverished fish fauna of the Sepik system has prompted the suggestion that further species be introduced as a food source or commercial fishery. The Sepik River Fish Stock enhancement project was established in 1987 to address the potential risks and benefits of fish stocking (Coates 1987). Importantly, Papua New Guinea is following recognized codes of practice for introductions (Turner 1988). This Code as referred to by Rongap and Coates sets standards for preliminary survey work, criteria for species to be introduced and the establishment of a testing program. Despite the comprehensive nature of the Sepik project, some concerns prevail as summarized by Hoese. For instance, only preliminary conclusions regarding the effects of introductions on native fishes can be reached. Furthermore, the rationale for introductions and their potential success has been questioned. Regardless of these drawbacks, the Sepik is one of the few examples where such a code is being followed. It can be considered a model system in