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渔业资源可持续利用与生态环境修复

Sustainable Utilization of Fishery Resources & Rehabilitation of Fishery Ecotope

论文摘要集
ABSTRACTS

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目　录

注：题目标“★”者为特约专题发言。

Note: The subjects with a symbol “★” are speeches onspecial topics.

第一部分

Part I

主题发言

Keynote Speeches

Climate change effects on the economics and management of world fisheries

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Abstract: Climate and marine ecosystem research informs us that marine fish resources would come under increasing stress over the course of the 21st century as global climate change, ocean acidification and de-oxygenation combine with other stresses on the ocean, including heavy fishing pressure and marine pollution, to change the primary productivity of fish populations, shifts in distribution of their biomass and changes in the potential yield of exploited marine species. Given these predicted changes and the fact that (i) marine fish resources are already challenging to manage because of their common property nature; and (ii) they provide the world large market benefits (animal protein, jobs and profits) and non-market benefits (e.g., existence and bequest values), both the economics and management of marine fisheries are bound to be affected as warming increases into the future. The objective of this chapter is to explore the likely effects on both the economics and management of marine fisheries into the future.

The basis and application of fishery resource conservation

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Abstract: Fishery resource conservation forms a continuum from protectionism to rational utilization, and implementation of specific conservation approach methodologies relies in part on well-defined objectives, an agreed set of expected outcomes and an effective framework to facilitate information integration to meet the objectives. In many cases, conservation objectives are ill defined, expected outcomes differ between participants and effective frameworks are not applied due to budgetary or data constraints, unwanted outcomes or undefined framework. These shortcomings impact the success of applied conservation measures and subsequent scientific advice, leading to adoption of irrational resource utilization approaches, negative socioeconomic consequences at all or partial sector levels, distrust of science and influx of special interest puppeteers promoting advocacy over science. This paper describes the forms of fishery resource conservation and their application relative to stated objectives. Differences in expected outcome based on specified goals (i.e., maximizing catch) are illustrated using common fishery science principles. Frameworks to promote the rational utilization of fishery resources are described, and examples of successes and failures provided based on case studies. The basis for the holy grail in fishery resource conservation, ecosystem approaches to fishery management, is discussed, as well as requirements for its application. A framework to advance this approach in coral reef ecosystems, I-REEF, is described, including expected outcomes.

Monitoring of toxic chemicals in aquatic environments: Options and approaches

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Abstract: As a science, the monitoring of chemicals in aquatic environments has advanced steadily over many decades. Historically, analysis of environmental samples for chemical content and monitoring for changes in natural biological populations and communities over either space or time have dominated assessment programs. Today, many additional options and approaches are available to researchers aiming to monitor or investigate contamination of aquatic ecosystems. In general, the underlying reason for undertaking a monitoring or research program will influence the choice of methods and approaches used. Investigative efforts driven by regulatory or compliance needs often differ from those driven by more open research and risk assessment goals. These underlying motivations also drive the focus of research and monitoring programs, thus dictating what abiotic and biotic components of a system are investigated (e.g., water, sediment, biota). While measuring chemical concentrations in various matrices, including biota, is commonly employed, chemical monitoring should not be considered the only option, especially since one cannot always know exactly what to analyze for when it comes to environmental samples – certainly not when cause-effect relationships are sought (assuming adverse biological effects are present). Outcomes are generally more favourable when chemical monitoring is paired with some form of biological monitoring or assessment. Options include conventional monitoring (surveys) of free-living biological populations and communities, *in-situ* exposure studies with caged organisms, use of microcosms/mesocosms (both lab and field based), laboratory-based toxicity tests and toxicity identification evaluations, biomarkers, and bioanalytical approaches and molecular technologies, or ideally some combination of the above. In addition, results from chemical analyses can be greatly influenced by sampling methods, sample handling, storage and preparation procedures, and analytical techniques. Similarly, results from monitoring and assessment programs can be greatly influenced by experimental and sampling designs, and logistical challenges (e.g., site safety and access, confounding factors) occasionally force researchers to employ alternate approaches, such as field-based mesocosms. Small experimental ecosystem approaches, such as microcosms and mesocosms, can also be useful tools for investigating bioremediation and restoration options and can serve as useful tools for upscaling successful experimental systems to full restoration systems, such as constructed/engineered wetlands.

第二部分

Part II

渔业资源评估与利用

Evaluation and Utilization of Fishery Resources

Age composition and growth difference of chum salmon migrating to Ussuri River

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Abstract: Age determining and biological parameters measuring were conducted for the chum salmons collected form the stocks migrating to Ussuri River for breeding. Back-calculated fork length was computed and the difference of growth between different maturation age groups was studied based on it. The result showed that the age groups of chum salmon were composed by 2^+, 3^+, 4^+ group, and female and male individuals have different age composition, average age are 3.43 and 3.24 respectively. Von Bertalanffy growth function was used to fit the fork length growth of chum salmon. ARSS(Analysis of the residual sum of squares) was used to judge the difference of chum salmon among the three age groups. The result showed the growth of chum salmons at different maturation age group has significant difference ($P<0.05$).The stocks at low maturation age group grow faster than the high age groups. With the age increasing growth speed become slower, but the growth index is not the smallest one at the last year in the ocean life stage. Genetic factor, ocean environment conditions, intra- and interspecific interaction affect the growth of chum salmon all together.

Key words: chum salmon, maturation age, growth difference

乌苏里江大麻哈鱼年龄结构及异龄组间生长差异

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摘要：对乌苏里江大麻哈鱼生殖洄游群体样本进行年龄鉴定和生物学测定，推算了各年龄段的叉长，并分析了性成熟年龄组间个体的生长差异性。年龄鉴定结果显示大麻哈鱼由 2^+，3^+，4^+ 龄群体组成，雌、雄大麻哈鱼平均年龄分别为 3.43 和 3.24 龄。采用 VonBertalanffy 生长方程（VBGF）拟合了大麻哈鱼各性成熟年龄组个体的叉长生长。基于 VBGF 生长方程的拟合结果，采用残差平方和（Analysis of the residual sum of squares，ARSS）分析各年龄组间大麻哈鱼的生长差异性，结果显示不同性成熟年龄组间的大麻哈鱼生长的差异性显著（$P<0.05$）。大麻哈鱼低龄组个体叉长生长速度较快，高龄组个体生长相对较慢，随着年龄的增加生长速度减慢，但是末年的生长指标却不是最低。大麻哈鱼的生长发育受遗传、海洋环境条件、种内、种间竞争等因素的共同影响。

关键词：大麻哈鱼，性成熟年龄，生长差异

Amino acid, fatty acid, and metal compositions in edible parts of three cultured economic crabs, *Scylla paramamosain*, *Portunus trituberculatus*, and *Eriocheir sinensis*

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Abstract: Mud crab, swimming crab, and Chinese mitten crab are the most popular economic crabs cultured in China. However, still little knowledge is available about the composition of amino acids, fatty acids, and heavy metals in those cultured crabs, despite the large amounts consumed. *Scylla paramamosain*, *Portunus trituberculatus*, and *Eriocheir sinensis*were respectively employed for an investigation of these three crabs. The results on the three representative species revealed that muscle, hepatopancreas, and ovary each had its own compositional pattern respectively. The composition of total amino acids in all the crabs was well balanced. The proportion of flavour amino acid in muscles was higher than that in hepatopancreas and ovary. The composition of total fatty acids showed that two functional unsaturated fatty acids, DHA (C22:6n3) and EPA (C20:5n3), were both abundant in the three crabs. The ratios of n3/n6 polyunsaturated fatty acids (PUFAs) in these crabs also showed that they were rich in n3 PUFA. Among the seven metals explored, Zn, Cu, and Cr were the most abundant. It also deserved attention that these crabs were threatened by high accumulation of Cd in the edible hepatopancreas, which might arise from the pollution of water for aquaculture. All these data could be used as a reference baseline for monitoring the food properties of the three crabs in levels of amino acids, fatty acids, and metals.

Keywords:amino acid,*Eriocheir sinensis*,fatty acids,heavy metal,*Portunus trituberculatus*,*Scylla paramamosain*